VOL. XXI. No. 12 DECEMBER 1936

MECCANO MAGAZINE

CUTTING SLOTS IN SOLID STEEL

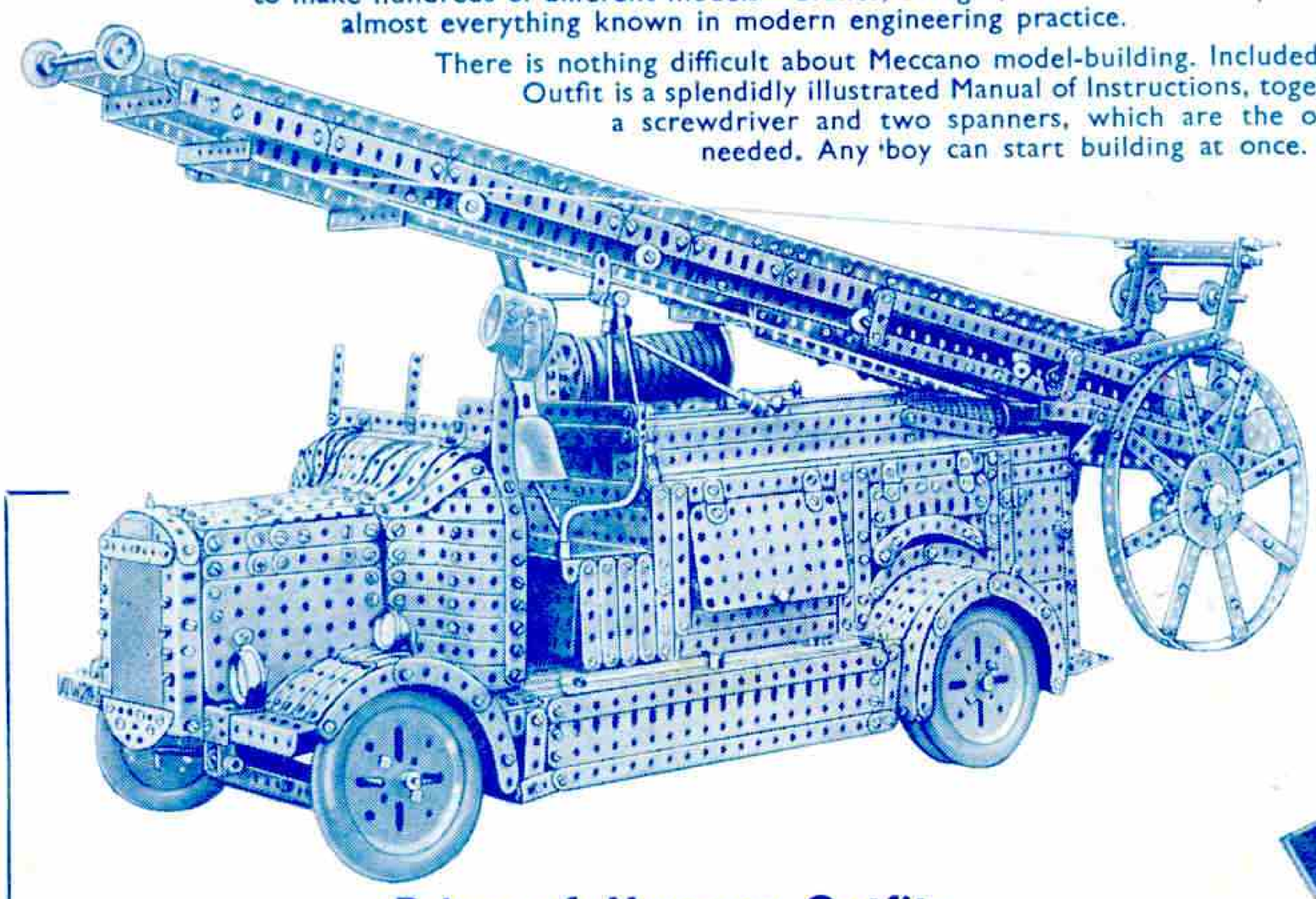
6D.

MECCANO

Boys! Build Real Engineering Models Like This—with Meccano

There is no other hobby in the world to equal Meccano Model-building; and none that is so full of thrilling interest for boys. Meccano is REAL engineering in miniature. The models are built with REAL engineering parts, accurately made of steel and brass, which can be used over and over again to make hundreds of different models—Cranes, Bridges, Motor Cars, Aeroplanes, in fact almost everything known in modern engineering practice.

There is nothing difficult about Meccano model-building. Included in every Outfit is a splendidly illustrated Manual of Instructions, together with a screwdriver and two spanners, which are the only tools needed. Any boy can start building at once.



This fine Meccano model is a reproduction to scale of the big Scammell Fire Engine illustrated at the foot of this page. The model is remarkably realistic in detail and is fitted with front and rear semi-elliptic springs, modified Ackermann steering gear, and gear-box incorporating three forward speeds and one reverse. The pump control apparatus is worked on exactly similar principles to those followed in the prototype, while the fire escape extends to a length of nearly eight feet. The motive power by which the model is propelled is supplied by a Meccano Electric Motor.

Prices of Meccano Outfits

COMPLETE OUTFITS

O	Outfit	each	3/6
A	"	"	5/-
B	"	"	7/6
C	"	"	10/-
D	"	"	15/-
E	"	"	20/-
F	"	"	30/-
G	"	"	55/-
H	" (Carton)	"	72/6
Hw	" (Cabinet)	"	97/6
K	" (Carton)	"	132/6
Kw	" (Cabinet)	"	157/6
L	" (")	"	400/-

ACCESSORY OUTFITS

Oa	converts O Outfit into	A ...	...	each	1/6
Aa	" A " "	B ...	...	"	2/6
Ba	" B " "	C ...	...	"	3/-
Ca	" C " "	D ...	...	"	5/6
Da	" D " "	E ...	...	"	5/6
Ea	" E " "	F ...	...	"	11/-
Fa	" F " "	G ...	...	"	26/6
Ga	" G " "	H ...	...	"	17/6
Ha	" H " "	K ...	...	"	60/-
Ka	" K " "	L ...	...	"	225/-

B Meccano Outfit

The illustration below shows the "Silver Jubilee" Scammell Fire Engine owned by the Borough of Watford Fire Brigade, of which the above Meccano Model is a faithful reproduction.

D Meccano Outfi

MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

BIG RAILWAY NEWS

Hamleys News

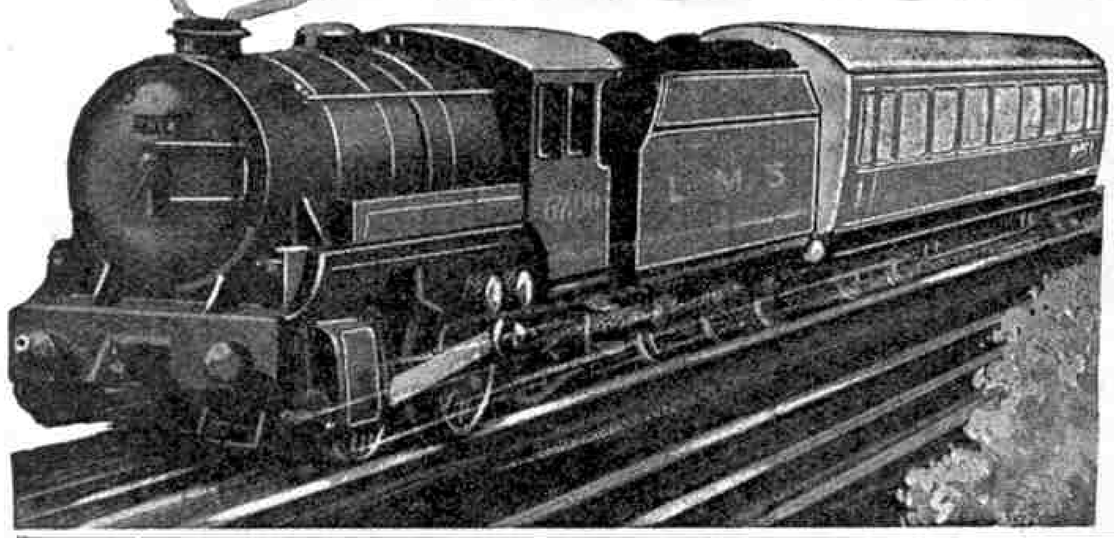
· HAMLEY · BROTHERS · LTD · ESTABLISHED · 1760 ·

200-202, REGENT ST., LONDON, W.I. OUR ONLY ADDRESS

PERFECT MINATURE MODELS

No. 15 *December, 1936*

RAILWAY SENSATION!



★ Here's something that's in the very forefront of modern mechanical models. Real railway trains, perfectly proportioned in miniature and driven by electric current. Two trains travelling on the same line—fast or slow, backwards or forwards—whilst you control them from two simple points.

You can have the most elaborate railway system in only a quarter of the space usually needed, and you'll have twice as many thrills. The rails, mounted on strong bakelite bases, are absolutely rigid and cannot bend. Every little part has been tested to give the utmost satisfaction.

This is the most elaborate model railway system ever conceived. There is a demonstration held at Hamleys every day. Go along and see it!

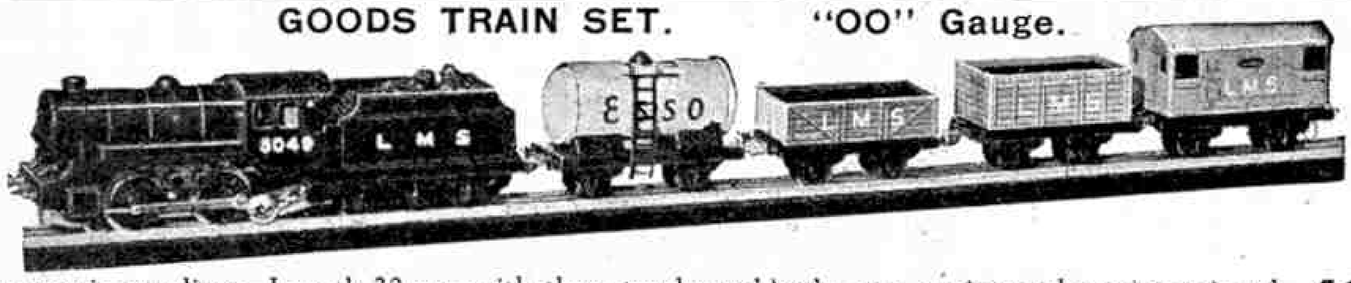
EXPRESS 3 COACH PASSENGER SET. **Double "O" Gauge.**

Length 28 ins. With three bogie coaches, twelve curved and four straight rails. Automatic couplings. controller, full instruction manual, etc. Price 45/-. Obtainable L.N.E.R. or L.M.S. Price Loco and tender, price 14/6. **45/-**

SUBURBAN PASSENGER TRAIN SET.

With automatic couplings. Length 14½ ins. With tank loco and three coaches, rails, controller, etc. Obtainable L.N.E.R. or L.M.S. Loco only, Price 14/-. As passenger set, price **35/-**

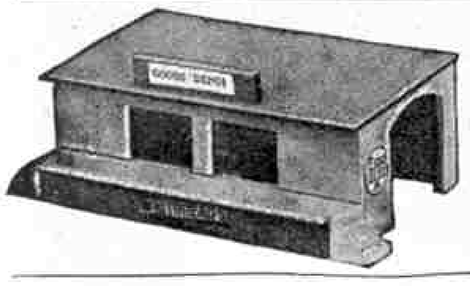
GOODS TRAIN SET. **"OO" Gauge.**



With automatic couplings. Length 20 ins. with three trucks and brake van, engine and tender painted black and lettered either L.M.S. or L.N.E.R. Complete with track, etc. As passenger set. Price **42/-**

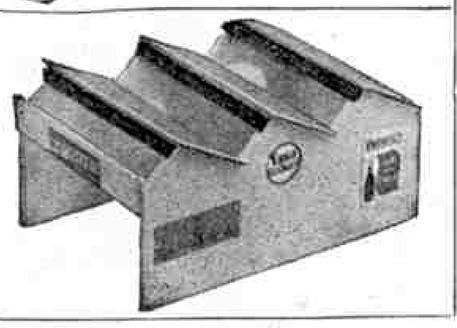
Fully illustrated literature sent free upon request. *Every article may be purchased separately.*

Goods Depot



For track, loading platform, sliding single doors. Trucks can be run into depot. Length 10½ ins. Price Post 6d. **3/11**

Engine Shed

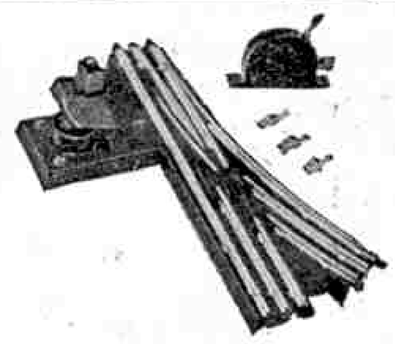


For double track with unbreakable transparent roof. Length 9 ins. Price Post 6d. **3/11**

Terminus Station

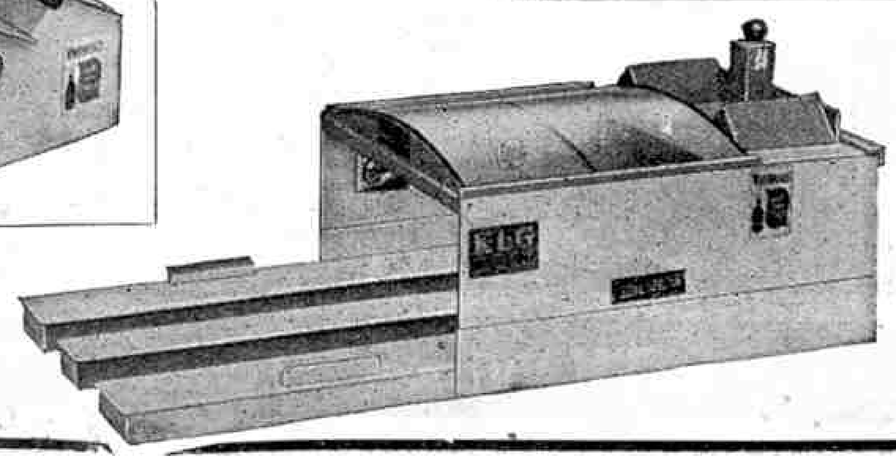
For double track. Three platforms, entrance hall. domed celluloid roof. Length of station, 28 ins. Price Post 9d. **15/-**

Electric Remote Control Points



Complete with point levers, plugs and connecting wires. Price Post 4d. **16/6** per pair.

Hand operated type **10/6** per pair

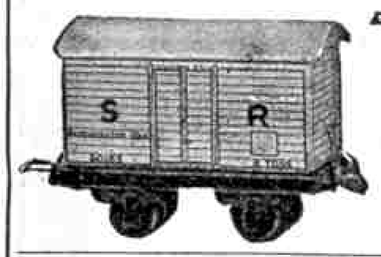


Railway Station

Modern design, concrete colouring, scale advertisements. Platform length 21 ins. Price Post 6d. **6/9**

Refrigerator Truck

Cream with S.R. lettering. Price Post 3d. **1/3**



Tank Truck

"Esso" or "U.D." Milk. Price Post 3d. **1/9**

Signal Cabin

Specially designed to place over control levers, hinged roof for easy operation. Length 7 ins. Post 4d. Price **2/11**

Transformer

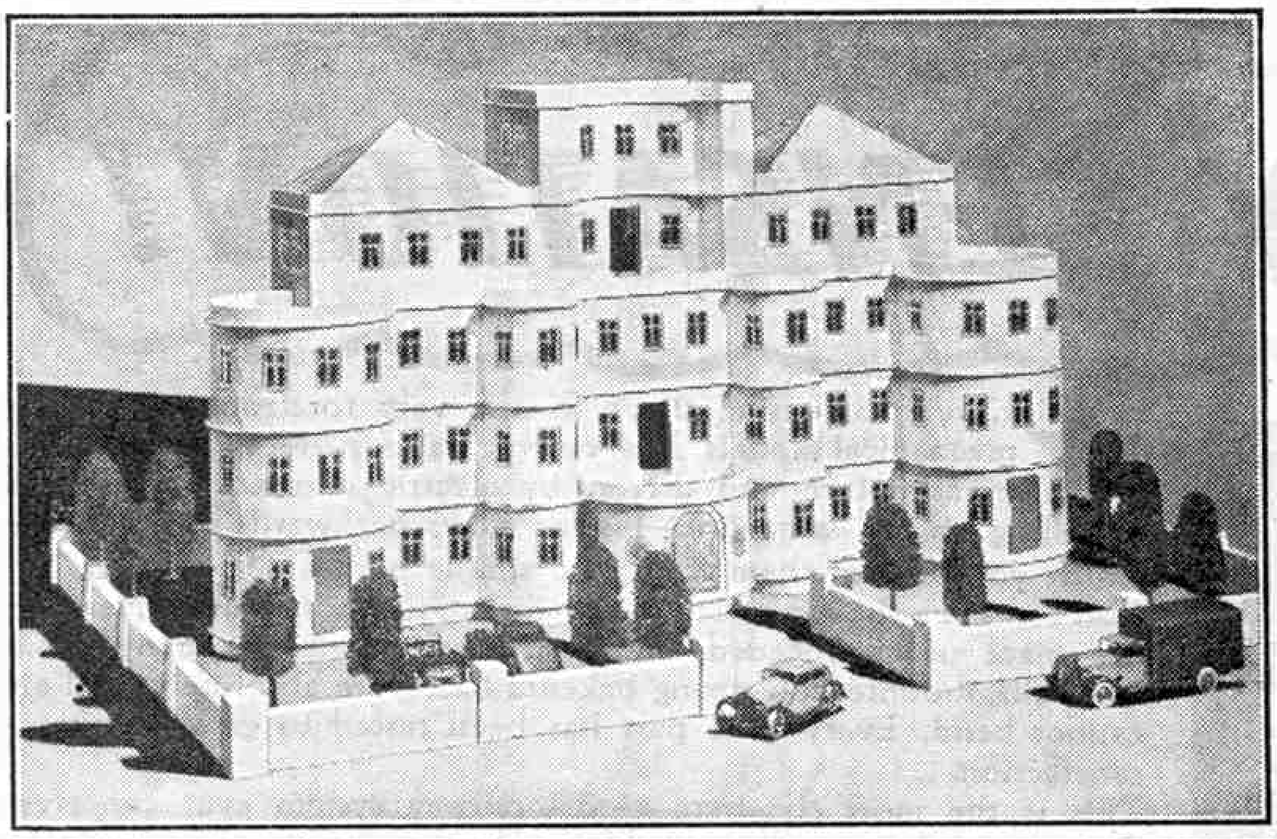
Of modern design. Output 14 volts at one amp. Complete with plug and flex for A.C. mains. Price Post 6d. **10/6**

(Please state voltage when ordering.)

Speed Controller

Gives perfect control, all speeds, fitted automatic cut-out. Price Post 3d. **7/6**

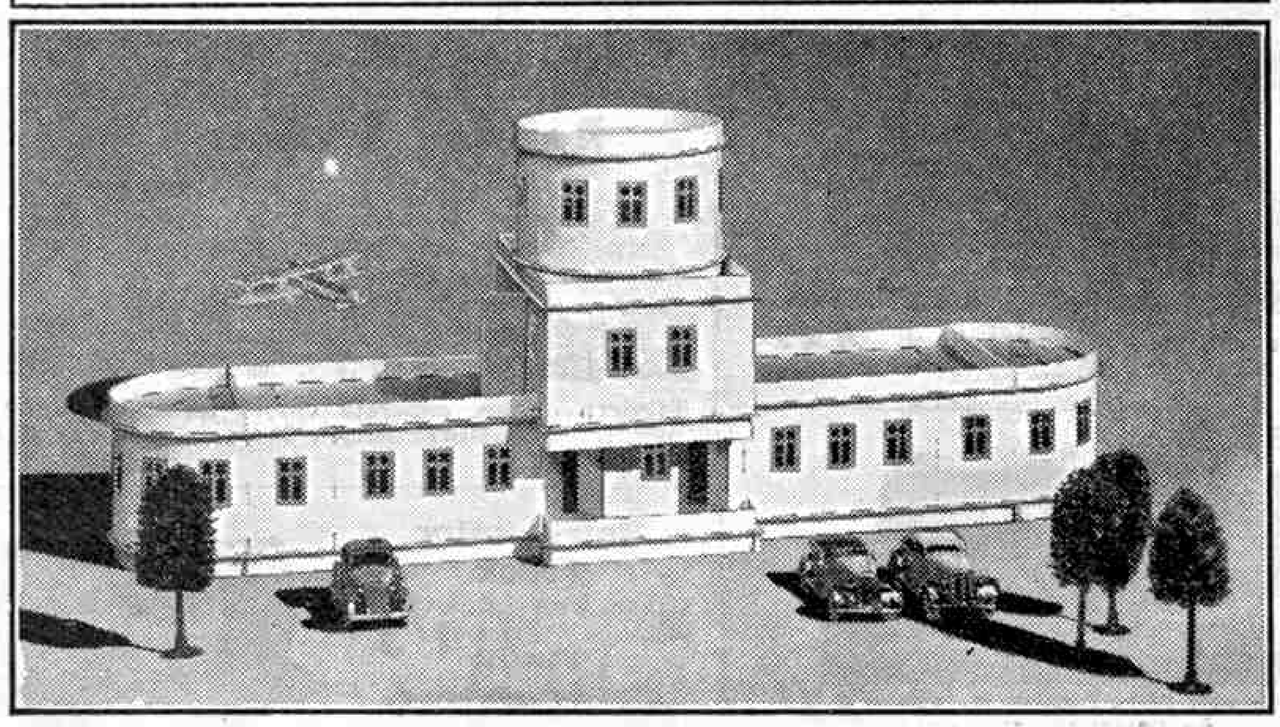
SAMLO

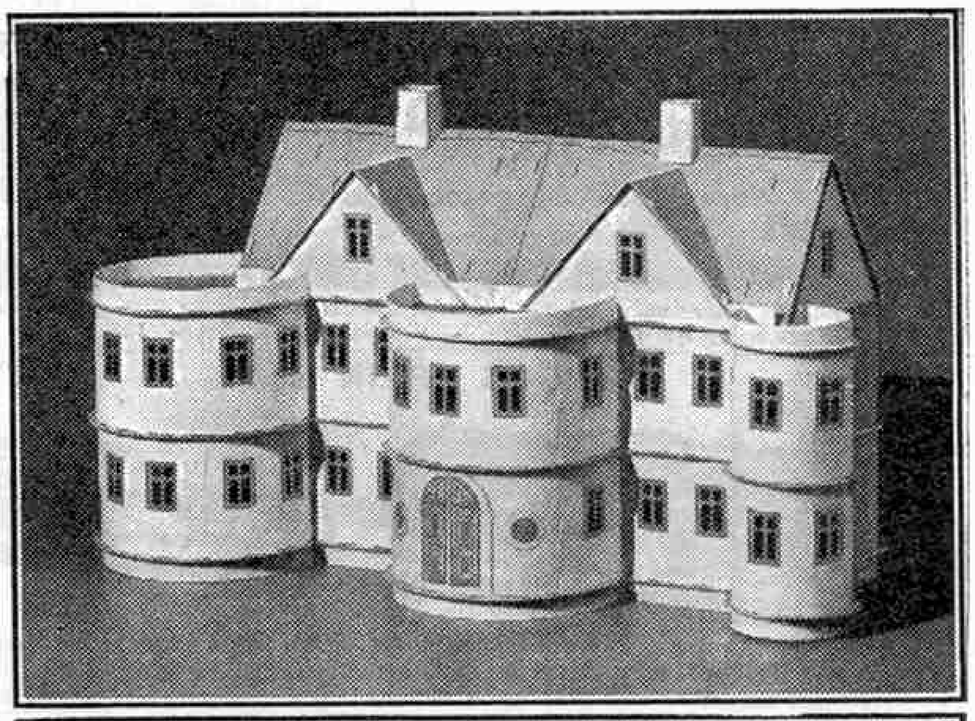


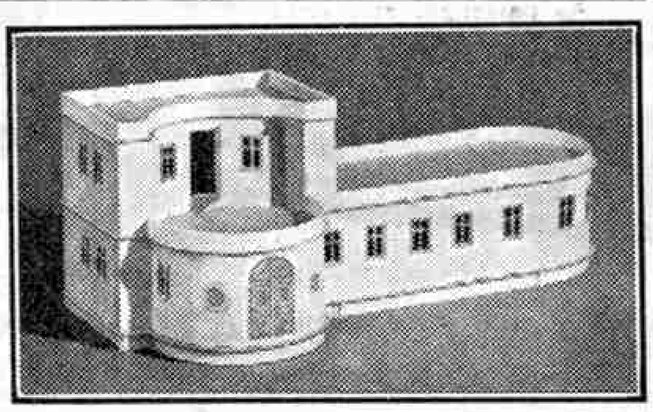
REALISTIC BUILDING SETS

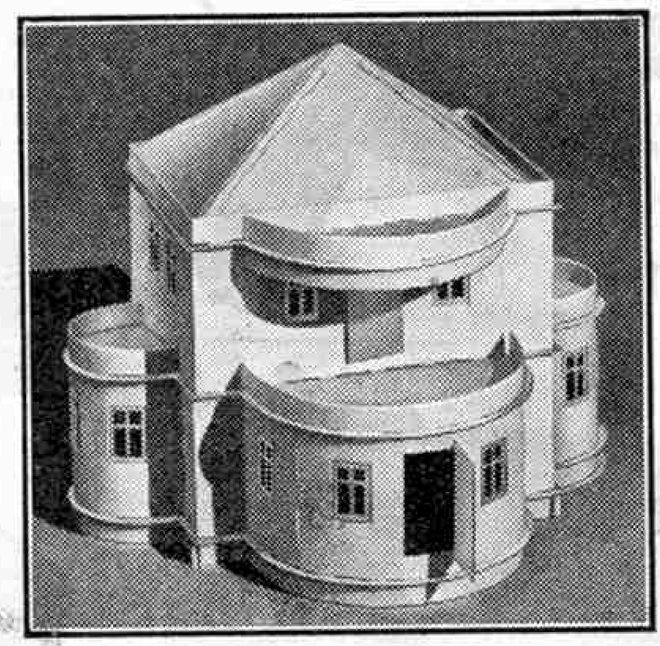
SAMLO marks a new departure in constructional toys, inasmuch as it provides actual scale models, and gives a perfect reproduction of the building, and not a skeleton effect.

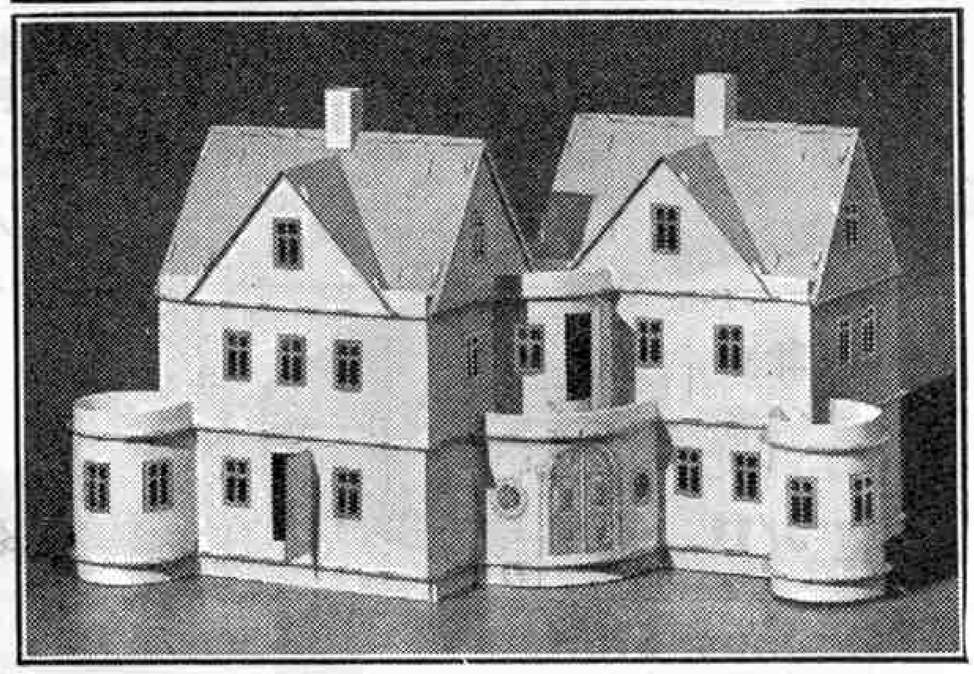
SAMLO is the most complete and instructive hobby ever invented. SAMLO is easy to assemble and easy to dismantle. The same SAMLO parts can be used innumerable times, being made of a special material. Glue, scissors or other tools are not required. SAMLO is an invaluable help to the young architect, constructional engineer and builder of the future.











Complete Outfit "A" **3′6**
Supplementary Outfit "Aa" ... 2/6

Complete Outfit "B" **5′6**
Supplementary Outfit "Ba" ... 2/6

Complete Outfit "C" **7′6**
Supplementary Outfit "Ca" ... 3/6

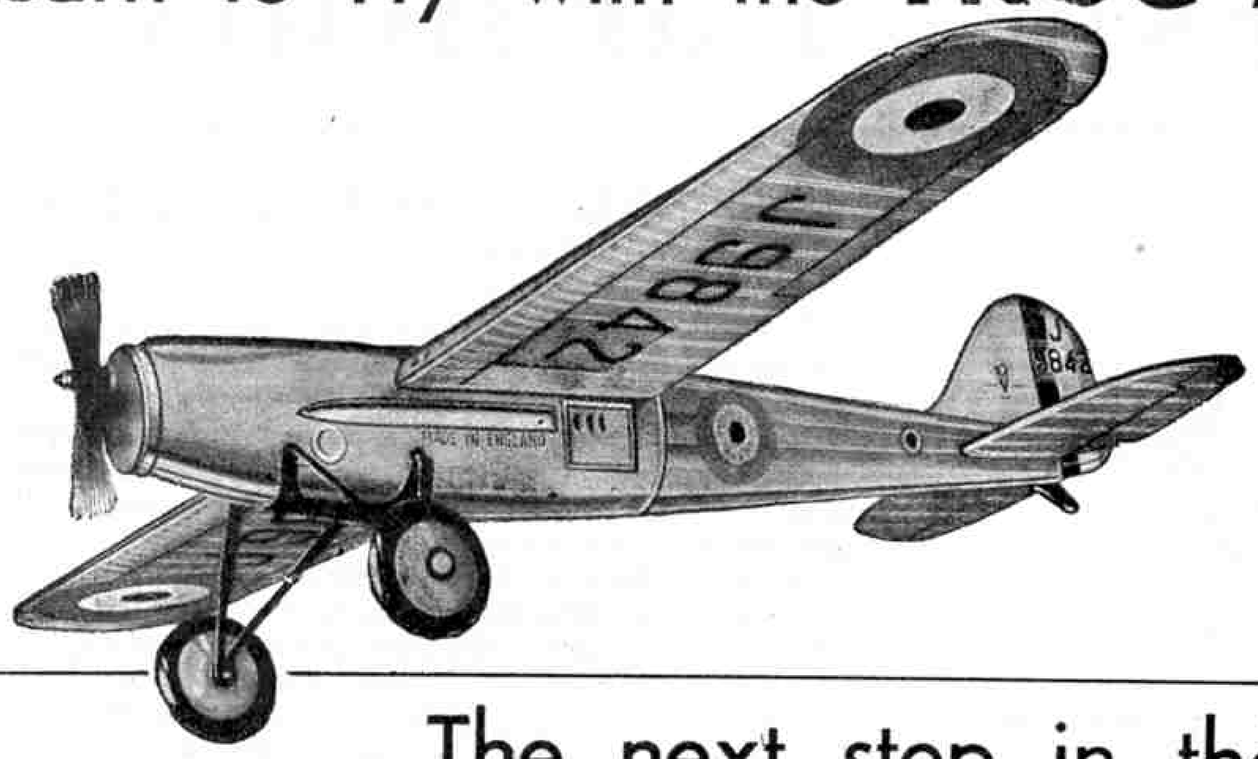
Complete Outfit "D" **10′6**
Supplementary Outfit "Da" ... 12/6

Complete Outfit "E" **21′-**

SAMLO builds realistic Houses, Hotels, Flats, Garages, Fire Stations—in fact, anything that can be built may be portrayed by SAMLO in a life-like manner.

OBTAINABLE FROM ALL STATIONERS, STORES, TOY DEALERS *ETC.*

Learn to Fly with the **FROG MK IV**



All-metal Fuselage of Tubular Construction, Patent Detachable Undercarriage, and Hollow Wings. Powerful Motor, coupled to a Precision-cut Gearbox, accurately carved Airscrew. Motor Lubricant, Gearbox Oil, two spare Motors and Inserter Rod, and fully illustrated Flying Manual. Wing span 11½". With practice it will fly 300 feet.

Now only **5/-**

Complete with Patent High-speed Winder Box which eliminates tedious winding.

The next step in the **FROG** range

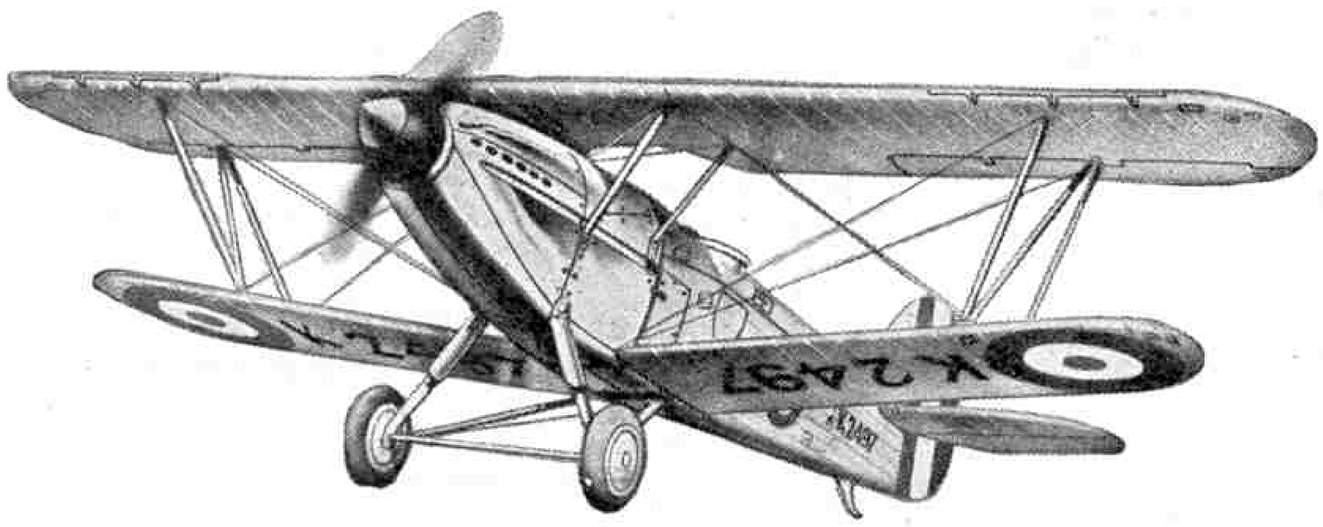
PUSS MOTH MONOPLANE

All-metal Tubular Fuselage with strengthening Bulkheads. Fitted with Transparent Windows. Quickly Detachable Hollow Wings with Internal Supporting Ribs and Streamlined Struts. Powerful Dual Motor with Step-up Gearbox. Adjustable controls. Motor Lubricant, Gearbox Oil, Spare Motors, Dual Inserter Rod and fully illustrated Flying Manual. Wing Span 18½". With practice it will rise off the ground and fly 600 feet.

Price **17/6**

Complete with Patent High-speed Winder Box which eliminates tedious winding.

The machine for the **FROG** Ace



HAWKER HART MK II

Wing Span 19". Length 15½". A scale model of the world-famous R.A.F. High-Speed Day Bomber. Lubricant for Gearbox and Motors, Triple Inserter Rod, Spare Motors and profusely illustrated Flying Manual.
Flies 700 feet, if handled skilfully.

Price **42/-**

Complete with Patent High-speed Winder Box which eliminates tedious winding.

FREE FLIGHT INSTRUCTION

Lines Bros. will give free flight instruction by appointment on the Frog Aerodrome at Merton. Telephone: Liberty 1041.

FROG FLYING SCALE MODEL AIRCRAFT

TRADE MARK REGD.

All FROG model aircraft are covered by World Patents granted and pending. Made in England by International Model Aircraft Ltd.

LINES BROS. LTD., Tri-ang Works, Morden Rd., Merton, London, S.W.19

COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19

Please send me your **NEW** "Frog" coloured leaflet with particulars of the "Frog" Flying Club and how to obtain handsome enamelled Air Force pilot badges.

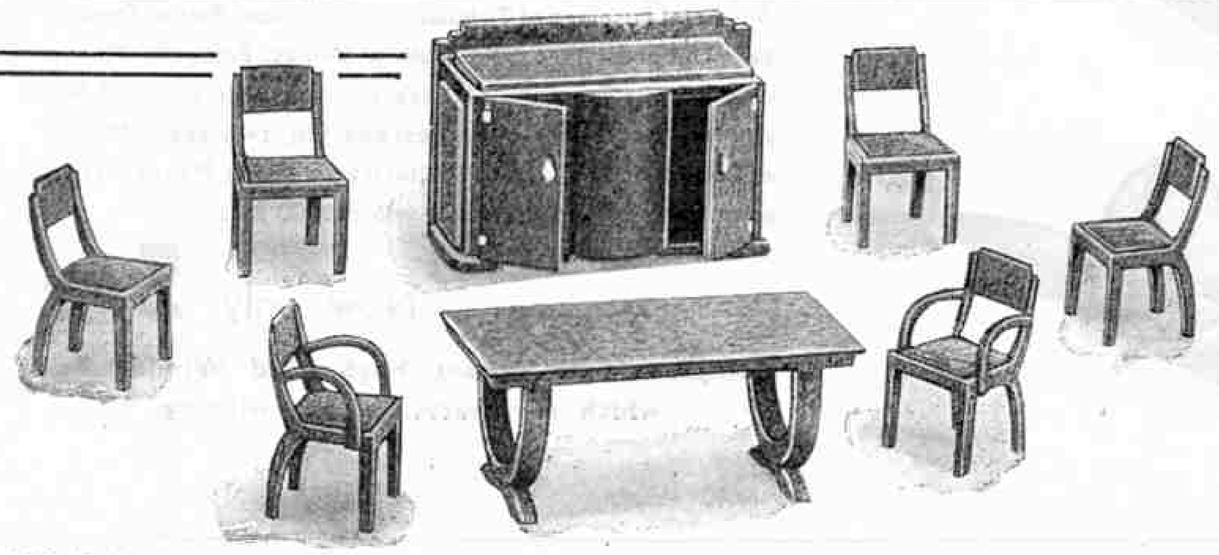
Name .....

Address.....

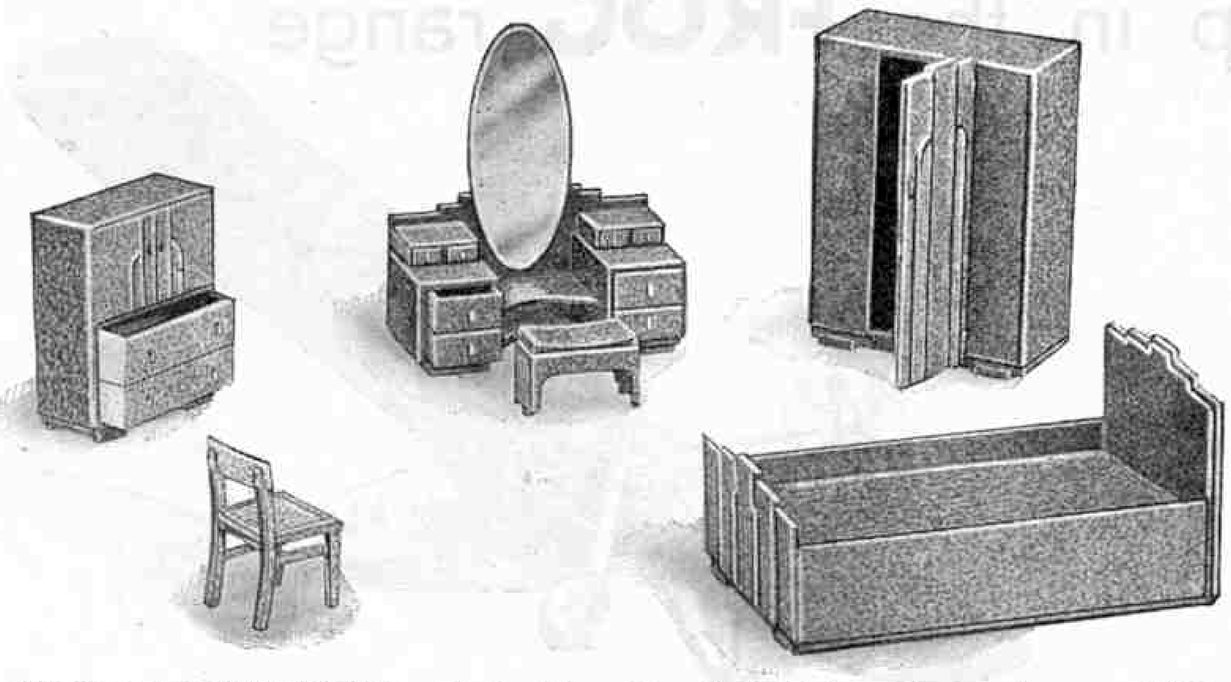
.....

Please write in block letters. 12-36

Dinky Toys Doll's House Furniture

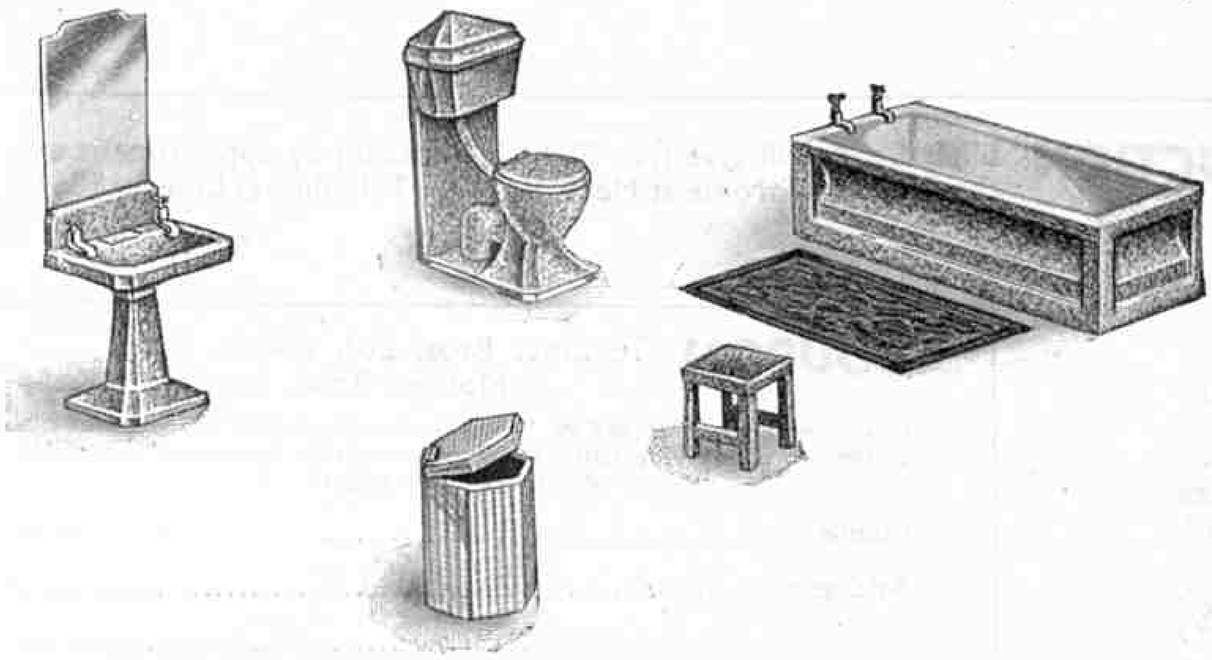


DINING-ROOM FURNITURE. Dinky Toys No. 101. Price of complete set **2/3**



BEDROOM FURNITURE. Dinky Toys No. 102. Price of complete set **2/11**

KITCHEN FURNITURE. Dinky Toys No. 103. Price of complete set **2/6**



BATHROOM FURNITURE. Dinky Toys No. 104. Price of complete set **2/-**

A WONDERFUL SERIES OF ACTUAL SCALE MODELS

The jolly Doll's House Furniture that forms a special extension of the range of Dinky Toys has already gained wonderful popularity. The reason is easy to understand. Every piece is a perfect miniature scale model based on a typical example of modern design, and with a beauty of finish that must be seen to be appreciated. All are made to a scale of 7/16th of an inch to one foot, which is as nearly as possible 1/27th full size. The different items of the four complete suites—dining-room, bedroom, bathroom and kitchen—are fascinating to handle, and there is a real thrill in manipulating the tiny opening doors and drawers. These miniatures are absolutely unequalled in their perfection.

Each of the suites can be bought either as a complete set or in separate items. It is thus possible to increase the size of any one set by adding more chairs or other items as required.

DINING-ROOM FURNITURE

Dinky Toys No. 101. Price of complete set 2/3

No. 101a.	Table	5d. each
No. 101b.	Sideboard (Opening doors)	9d. ,,
No. 101c.	Carver Chairs	3d. ,,
No. 101d.	Chairs	2d. ,,

Supplied in walnut brown finish only.

BEDROOM FURNITURE

Dinky Toys No. 102. Price of complete set 2/11

No. 102a.	Bed	6d. each
No. 102b.	Wardrobe (Opening door)	9d. ,,
No. 102c.	Dressing Table (Opening drawers) ...	10d. ,,
No. 102d.	Dressing Chest (Opening drawers)... ...	6d. ,,
No. 102e.	Dressing Table Stool	2d. ,,
No. 102f.	Chair	2d. ,,

Supplied in colour or walnut brown finish.

KITCHEN FURNITURE

Dinky Toys No. 103. Price of complete set 2/6

No. 103a.	Refrigerator (Opening door)	8d. each
No. 103b.	Kitchen Cabinet (Opening doors and drawer)	10d. ,,
No. 103c.	Electric Cooker (Opening door)	6d. ,,
No. 103d.	Table	4d. ,,
No. 103e.	Chair	2d. ,,

Supplied in two colour schemes—light blue and white; light green and cream.

BATHROOM FURNITURE

Dinky Toys No. 104. Price of complete set 2/–

No. 104a.	Bath	6d. each
No. 104b.	Bath Mat	1d. ,,
No. 104c.	Pedestal Hand Basin	6d. ,,
No. 104d.	Stool	2d. ,,
No. 104e.	Linen Basket (Opening lid)	4d. ,,
No. 104f.	Toilet (Lifting lid)	6d. ,,

Supplied in two colour schemes—pink and white; light green and white.

Make a point of seeing the display of Dinky Toys furniture at your dealers. You have only to see them to be convinced that every item is far superior to anything of its kind that has ever before been produced for the delight and pleasure of young people.

"Dolly Varden" Doll's House

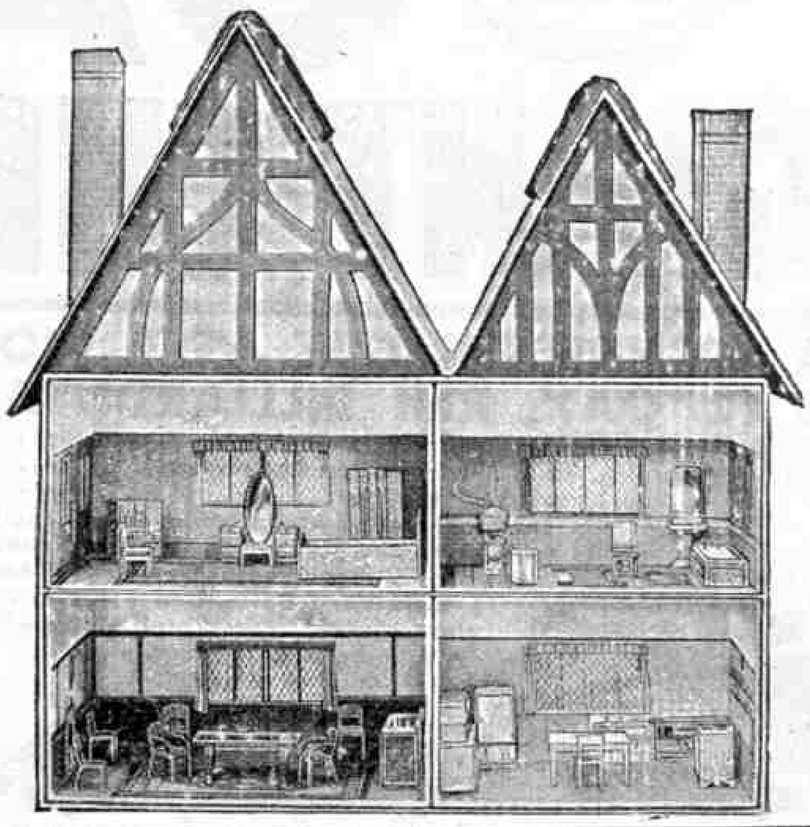
THE IDEAL GIFT FOR GIRLS

The "Dolly Varden" Doll's House provides a perfect setting for the Dinky Toys Doll's House furniture.

The exterior of the house is designed to represent a half-timbered dwelling, while the interior decorations, which are printed in nine colours, are in an attractive modern style.

Reinforced leather board is the material of which the house is constructed, and although it is collapsible it is as strong as a wood structure when set up. The container, which also is made of reinforced leather board, opens out to show a lovely garden with Tennis Lawn, Carriage Drive, and Rockery, providing an exquisite setting for play with Dinky Toys and Hornby Trees, Hedging, etc. The arrangement of the Dinky Toys Furniture, shown in the illustration on the right is intended only as a suggestion. Great fun is to be had from re-arranging the various items, perhaps on the lines of some familiar real rooms.

Price of "Dolly Varden" Doll's House—Price **9/6.**



This back view of the Doll's House shows the four suites of Dinky Toys Doll's House Furniture tastefully arranged in position.

The Couch Hammock, Tennis Net, Garden Seats, Dinky Toys Garage, Motor Cars and Figures, and the Hornby Trees and Hedging featured in the illustration below are not included with the Doll's House and Garden.

DIMENSIONS

The following are the overall dimensions of the "Dolly Varden" Doll's House when built up ready for play. Length, 1 ft. 6¾ in. Depth, 10¼ in. Height, 1 ft. 6¾ in.

The open container on which the house stands measures 3 ft. 3½ in. by 2 ft. 5½ in.

When the house is dismantled and packed in container, the overall dimensions of the complete parcel are ¾ in. x 1 ft. 7½ in. x 2 ft. 5½ in.

MECCANO LTD. LIVERPOOL 13

BRITAIN'S BIGGEST DISPLAY OF GIFTS FOR BOYS OF ALL AGES

THE NAME *Gamages* GUARANTEES THE VALUE

GAMAGES

GIANT CHRISTMAS BAZAAR

NOW IN FULL SWING

A WONDERFUL GIFT AT A WONDERFUL PRICE.
5 ft. OAK Rail BILLIARD TABLE FOR ONLY 49'6

Perfectly modelled on the lines of a Standard Table. Best quality laminated bed, tested for accuracy and strongly battened to obviate warping. **Solid Oak Cushion Rails** in attractive heavy design, highly polished Dark colour. Solid Para rubber cushions positioned to ensure maximum resiliency and billiard-table "angle" accuracy. Bed and cushions covered with splendid quality English woven cloth. Brassed pocket plates leather-covered and fitted cord pocket nets. Adjustable rubber-shod feet for adjusting level of Table. Each Table is supplied complete with the following Accessories: **Set of 3 guaranteed turned composition 1½ in. Billiard Balls, two 4 ft. Cues, large Marking Board, fitted with brass runners and pointers, Chalk and Book of Rules.**

Also in beautiful mahogany colour finish at same price.

DELIVERED ON FIRST OF 6 MONTHLY PAYMENTS OF 9'-

Overall Size: 5 ft. 4 ins. × 2 ft. 10 ins.

'GAMAGE' SNOOKER SETS In view of the vastly increased popularity of Snooker, we strongly recommend the purchase of a Snooker Set with any of our Billiard Tables. **5 ft. Table, with 17 Ball Snooker Set, 66/-, or 6 Monthly Payments of 12/-.**

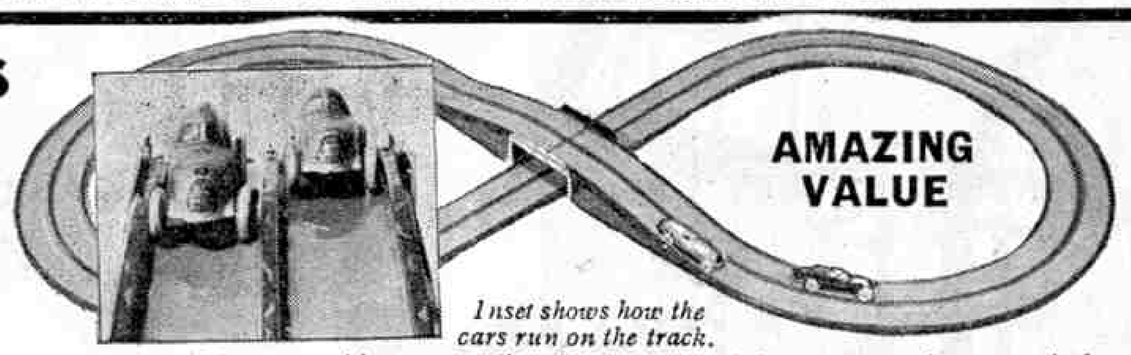
Smaller Sizes in stained oak or mahogany finish.

Size of table	Length of cues	Diam. of balls	
4 ft.	3 ft. 6 in.	1⅜ in.	35/-
*3 ft. 6 in.	3 ft.	1¼ in.	23/6
*3 ft.	3 ft.	1⅛ in.	19/6

**The last two tables have slightly cheaper quality cloth.*

Carriage Paid on Billiard Tables to Nearest Railway Station, England and Wales.

THE FAMOUS 'GAMAGE' SPEEDWAY
For Speed and Thrills



AMAZING VALUE

Inset shows how the cars run on the track.

A special purchase of 10,000 of these wonderful toys enables us to offer them at a much lower price than ever before; in fact last Christmas they were 12/6. The entire track when assembled measures 57" long by 25½" wide. Each section is firmly fixed together by special clips. The two Cars each measuring 4" long are fitted with Brakes, and two keys are included. With one winding the Cars race round the Track, up the hill, across the bridge, and down, speeding round the track again under the bridge, lapping the track 7 to 8 times. Note. 3 or 4 Cars can be used and extra cars (each with brake) cost only **9d.** each.

5'11 *Foreign.* *Post 6d.*

Controlled by Electric Magnetic Waves!

DOCKING THE "QUEEN MARY"

An entirely new and fascinating toy and one that will make a great appeal as a Christmas Gift. Ships moving on the water may be sailed, steered, reversed, and docked by electric magnetic waves. Complete with models of R.M.S. "Queen Mary," coastal steamer, tug, and harbour. Magnetic control bar. Simple to operate and can be used on any table.

7'6

THE FAMOUS "SCHUCO-STUDIO" CAR

Undoubtedly the cleverest mechanical toy ever put on the market. The ingenious, steerable, driving-school car with differential gear! Driving, steering and parking exercises may be carried out. Wheels and tyres can be changed; detachable steering wheel. Winding by crank lever or by friction wheel put under pressure on a backward movement.

No. 1 Set (Assembled Car), 3/6.

Set No. 2 comprises chassis, four wheels, tyres, steering lever, hubs, spanners, roller lifting jack and full instructions for assembly.

5'- *Foreign.*

NATIONAL HEADQUARTERS for MECCANO, HORNBY TRAINS and SPEED BOATS

See

The HUGE DISPLAY of MECCANO MODELS and OUTFITS

LONDON'S BIGGEST HORNBY RAILWAY ——Three trains Running at Once on the Same Layout

Expert Demonstrations of FROG, SKYBIRDS and WARNEFORD 'PLANES

Electrical and Chemistry Sets, Conjuring Sets, Steam Engines, Yachts, etc.

VERTICAL STEAM ENGINES

A splendid steam engine at a remarkably low price. Fitted with safety valve, whistle, filler, can and lamp. Height 10½ in. An ideal Christmas Gift.

5'- *Foreign.* *Post 6d.*

Ask for Copy of Gamages 52-Page Christmas Toy and Games List

GAMAGES, HOLBORN, LONDON, E.C 1

Telephone: HOLborn 8484.

"Gee Sis - it's a *real* movie show!"

By Permission of Walt Disney—Mickey Mouse Ltd.

STARRING
MICKEY MOUSE
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CHARLIE CHAPLIN, etc.

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Improved design. Brilliant lighting.

ALL-MAINS SET 22/6 each
for A.C. and D.C. 100-250 volts.

GIVE them a Bingoscope Ideal Home Cinema and you'll give them hours and hours of fun! They'll never tire of watching Mickey Mouse, Stan Laurel, Charlie Chaplin and all the other favourites. The new Bingoscope all-mains Movie projector is better and cheaper than ever this year. It costs only 22/6, yet it gives clear flickerless pictures—just like the big movies—and the films are non-inflammable. It's certainly the finest birthday or Christmas present you can choose for children of any age. It's cheap to buy, easy to run and maintain, and vastly entertaining—go and see for yourself at any store or toyshop.

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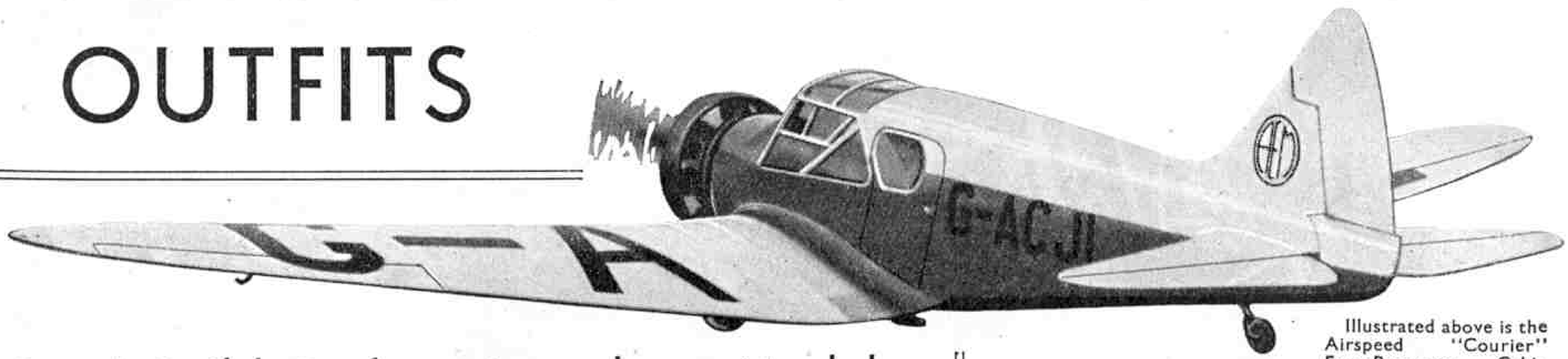
AEROPLANE CONSTRUCTOR OUTFITS



Illustrated above is the Airspeed "Courier" Four-Passenger Cabin Monoplane—a low wing cantilever machine that has become very popular in recent years.

Boys! Build Perfect Aeroplane Models

Every boy should know how aeroplanes are designed and constructed, and should be able to recognise the different types of machines at a glance. These fine Constructor Outfits contain a range of aeroplane parts by means of which boys are able to design and build their own Aeroplanes quite easily.

The illustrated Manual of Instructions included in each Outfit shows how to build wonderful models of high and low wing Monoplanes, Biplanes, Seaplanes and many other interesting types.

PRICE LIST

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No. OO AEROPLANE OUTFIT

This excellent new Outfit contains a good selection of Aeroplane Parts, with which realistic models of aeroplanes can be built. Price **3/3**

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An interesting range of models can be built with this Outfit, including high and low wing monoplanes. Price **4/6**

No. 1 AEROPLANE OUTFIT

Magnificent models of high and low wing monoplanes, and interesting model biplanes can be built with this fine Outfit. Price **7/6**

Aeroplane Constructor Accessory Outfit No. 1a, costing 6/–, will convert a No. 1 Outfit into a No. 2.

No. 2 AEROPLANE OUTFIT

The parts contained in this Outfit make possible a splendid range of models, including triple-engined monoplanes and biplanes and a racing seaplane. Price **12/6**

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No. 1 SPECIAL AEROPLANE OUTFIT

The parts in this Super Aeroplane Outfit will build over 20 realistic models of different types of aircraft. Price **12/6**

A No. 1a Special Aeroplane Accessory Outfit, Price 10/–, will convert a No. 1 Special Aeroplane Constructor Outfit into a No. 2 Special.

No. 2 SPECIAL AEROPLANE OUTFIT

This is the finest Aeroplane Constructor Outfit on the market. It contains a big range of aircraft parts, with which numerous models of practically any type of machine may be built—44 examples are shown in the Manual of Instructions that is included. Price **21/–**

All the Aeroplane Outfits are available in two different colour combinations—Red and Cream and Blue and White.

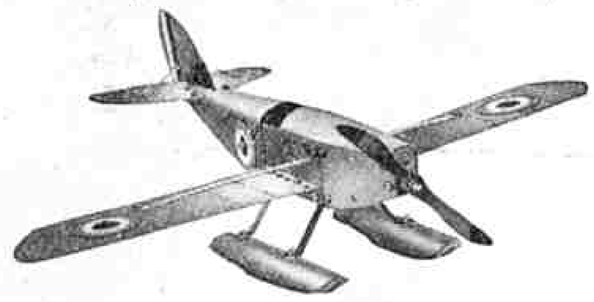
No. 1 AERO CLOCKWORK MOTOR

This long-running Motor fits into the fuselage of models made with No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfits. It will rotate the propeller at high speed. Price **1/9**

No. 2 AERO CLOCKWORK MOTOR

In addition to rotating the propeller this powerful Motor also drives the landing wheels of No. 1, No. 2, No. 1 Special or No. 2 Special Aeroplane Outfit models, making the machines taxi along the floor in a most realistic manner. Price **3/6**

No. 1 Aeroplane Constructor Outfit. Price 7/6



Model of a Racing Seaplane built with No. 2 Aeroplane Outfit.

Model of a Commercial Monoplane built with No. 2 Special Aeroplane Outfit.

No. 2 Special Aeroplane Outfit. Price 21/–

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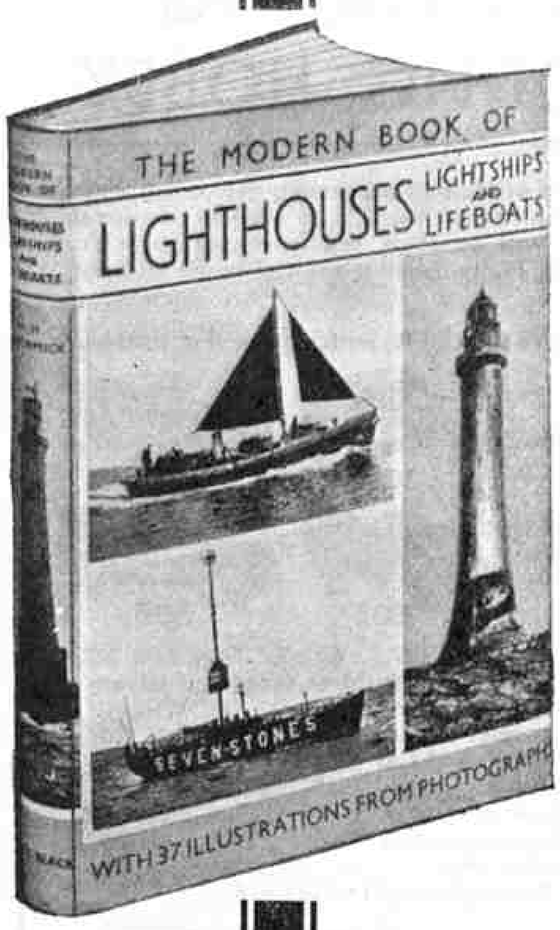

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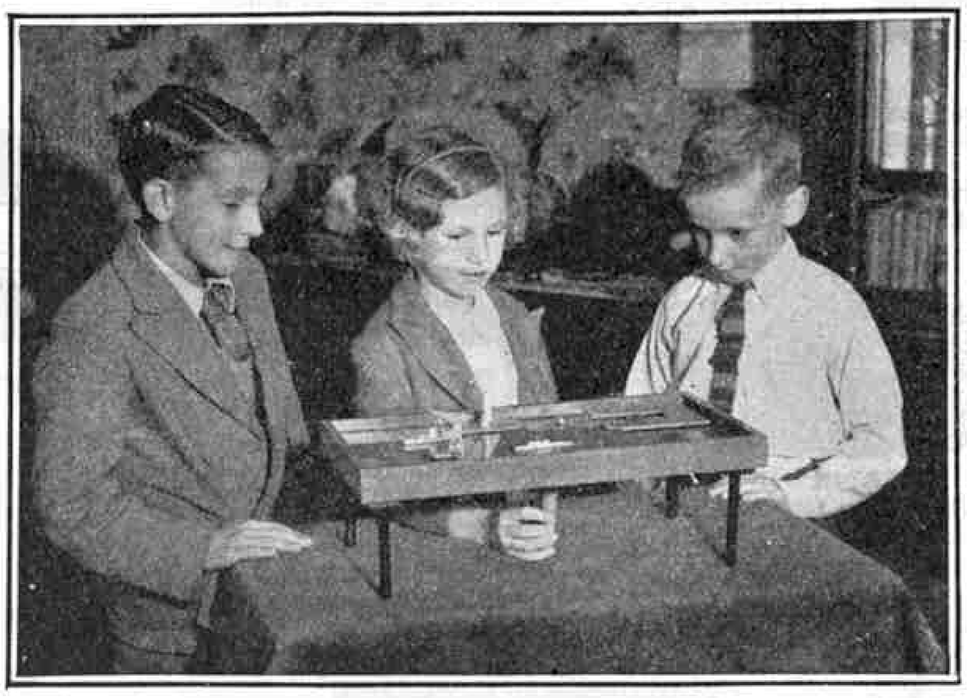

SET IS COMPLETE WITH R.M.S. "QUEEN MARY"—COASTAL STEAMER—TUG—MODEL HARBOUR—HARBOUR LIGHTS—BUILDINGS and MAGNETIC CONTROL BAR AND WATERTIGHT TANK, SIZE 9 in. x 18 in., FOR USE ON ANY TABLE

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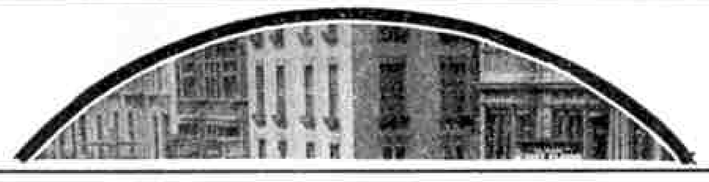
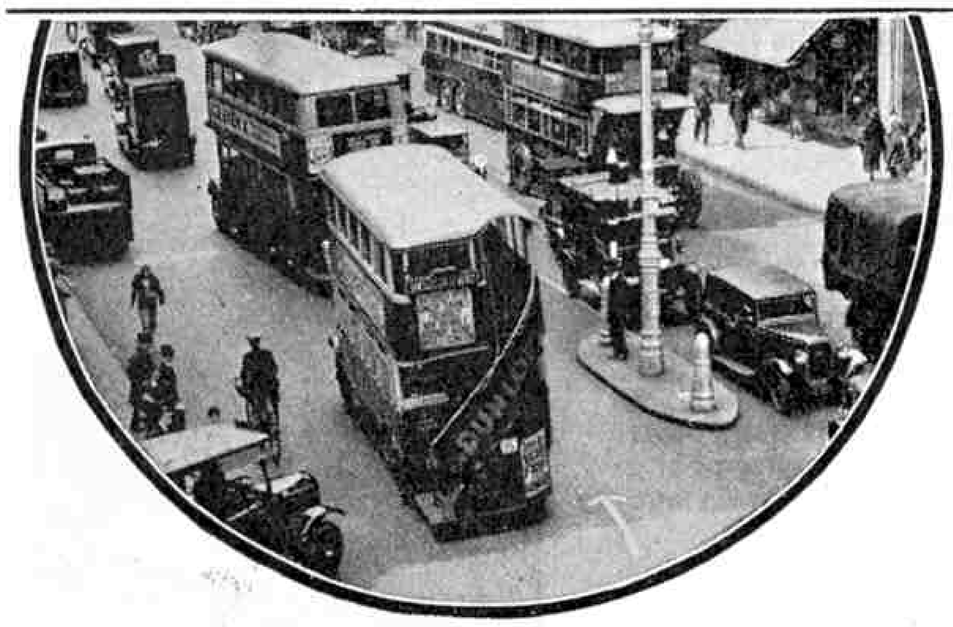


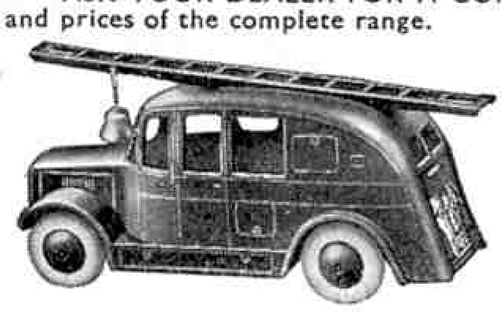
DINKY TOYS

A FASCINATING COLLECTING HOBBY

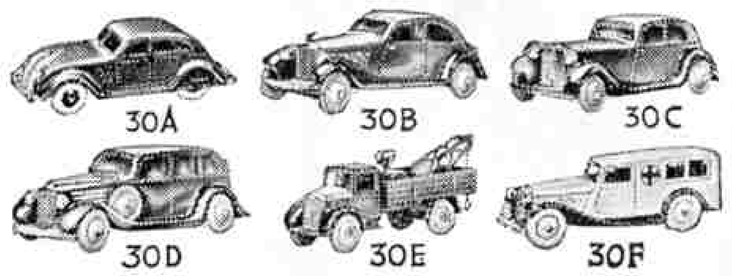


Dinky Toys are the most realistic and the most attractive models in miniature ever produced. These wonderful toys are unique in their perfection of finish, and their range is so wide as to appeal to all tastes. A selection is illustrated on these pages. As will be seen, trains, motor vehicles, aeroplanes, famous liners, etc., are already included in the range. Many other models of equal interest are in preparation.

ASK YOUR DEALER FOR A COPY OF THE DINKY TOYS FOLDER, which gives illustrations and prices of the complete range.



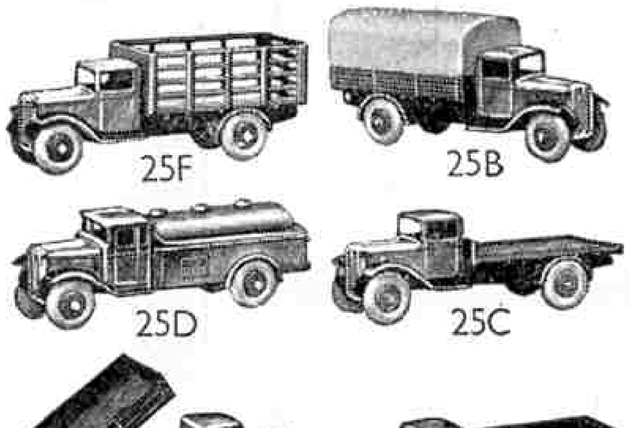
STREAMLINE FIRE ENGINE
Dinky Toys No. 25h
Fitted with detachable rubber tyres Price **9d.** each



MOTOR VEHICLES Dinky Toys No. 30
Fitted with detachable rubber tyres and silver-plated radiators

No. 30a	Chrysler Airflow Saloon	each	**9d.**
No. 30b	Rolls-Royce Car	,,	**9d.**
No. 30c	Daimler Car	,,	**9d.**
No. 30d	Vauxhall Car	,,	**9d.**
No. 30e	Breakdown Car	,,	**9d.**
No. 30f	Ambulance	,,	**9d.**

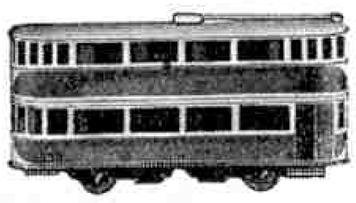
Price of complete set **4/6**



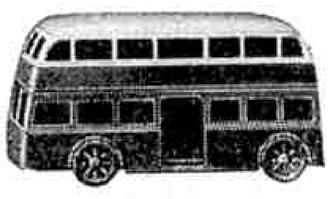
COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25
Fitted with detachable rubber tyres and silver-plated radiators

No. 25a	Wagon	each	**9d.**
No. 25b	Covered Van ...	,,	**9d.**
No. 25c	Flat Truck	,,	**9d.**
No. 25d	Petrol Tank Wagon	,,	**9d.**
No. 25e	Tipping Wagon ...	,,	**9d.**
No. 25f	Market Gardener's Van	,,	**9d.**

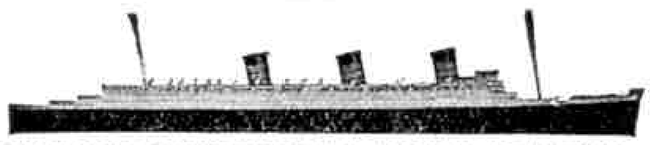
Price of complete set **4/6**



TRAM CAR
Dinky Toys No. 27
Assorted colours
Price **3d.** each

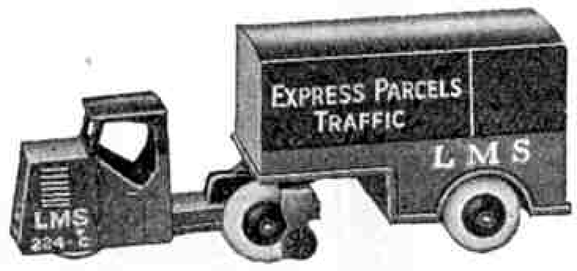


MOTOR BUS
Dinky Toys No. 29a
Assorted colours
Price **4d.** each



CUNARD WHITE STAR LINER "QUEEN MARY"
Dinky Toys No. 52a
Fitted with rollers and supplied in presentation box. Price **1/-** each
Dinky Toys No. 52m
Similar to No. 52a but not fitted with rollers, nor supplied in presentation box. Price **9d.** each

PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price **3d.** each



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Fitted with detachable rubber tyres

No. 33Ra	Railway Mechanical Horse	each	**8d.**
No. 33Rd	Trailer Van... ...	,,	**10d.**

Price, complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., **1/6**

DELIVERY VANS
Dinky Toys No. 28/1
Fitted with detachable rubber tyres

No. 28a	Golden Shred Van ...	each	**6d.**
No. 28b	Seccotine Van	,,	**6d.**
No. 28c	Manchester Guardian Van	,,	**6d.**
No. 28e	Firestone's Tyres Van ...	,,	**6d.**
No. 28f	Palethorpe's Sausage Van	,,	**6d.**
No. 28n	Atco Lawn Mowers Van ...	,,	**6d.**

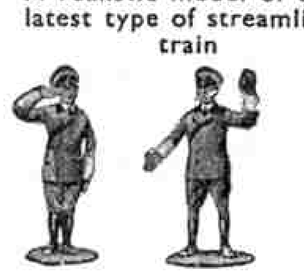
Price of complete set **3/-**

STRONGLY MADE UNBREAKABLE MODELS

A realistic model of the latest type of streamline train

"SILVER JUBILEE" TRAIN SET
Dinky Toys No. 16
Price **1/6** each

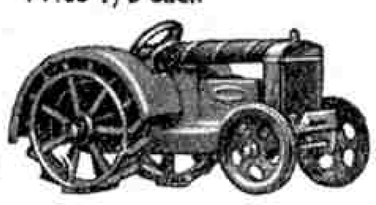
TANK
Dinky Toys No. 22f
Price **9d.** each



R.A.C. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar road hut and personnel of the R.A.C. Each item is finished in correct colours.

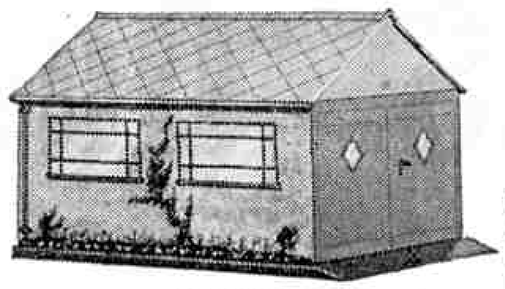
No. 43a	R.A.C. Box	each	**6d.**
No. 43b	R.A.C. Motor Cycle Patrol	,,	**9d.**
No. 43c	R.A.C. Guide directing traffic	,,	**3d.**
No. 43d	R.A.C. Guide at the salute	,,	**3d.**

Price of complete set **1/9**



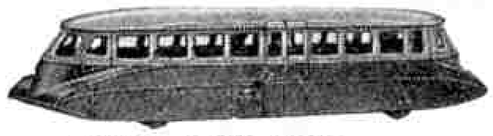
TRACTOR
Dinky Toys No. 22e
Price **9d.** each

STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres and silver-plated radiator. Price **6d.** each

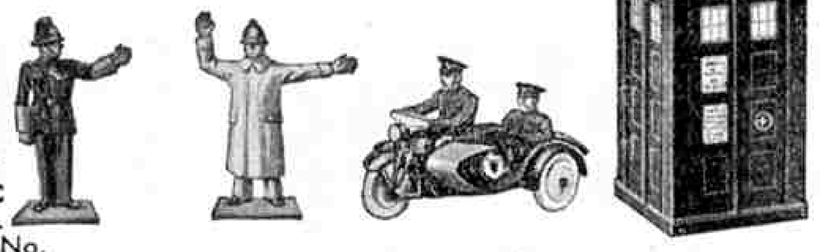


GARAGE
Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars. Price **1/6** each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a (Four face) Price **3d.** each
No. 47b (Three face) Price **3d.** each
No. 47c (Two face) Price **3d.** each



G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours Price **4d.** each



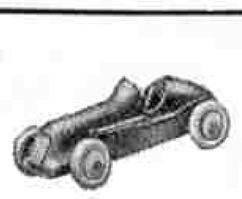
POLICE BOX, MOTOR CYCLE PATROL AND POLICEMEN
Dinky Toys No. 42

No. 42a	Police Box	each	**6d.**
No. 42b	Motor Cycle Patrol	,,	**10d.**
No. 42c	Point Duty Policeman (in White Coat)	,,	**3d.**
No. 42d	Point Duty Policeman	,,	**4d.**

Price of complete set **1/11**

FINISHED IN RICH COLOURS

DINKY TOYS



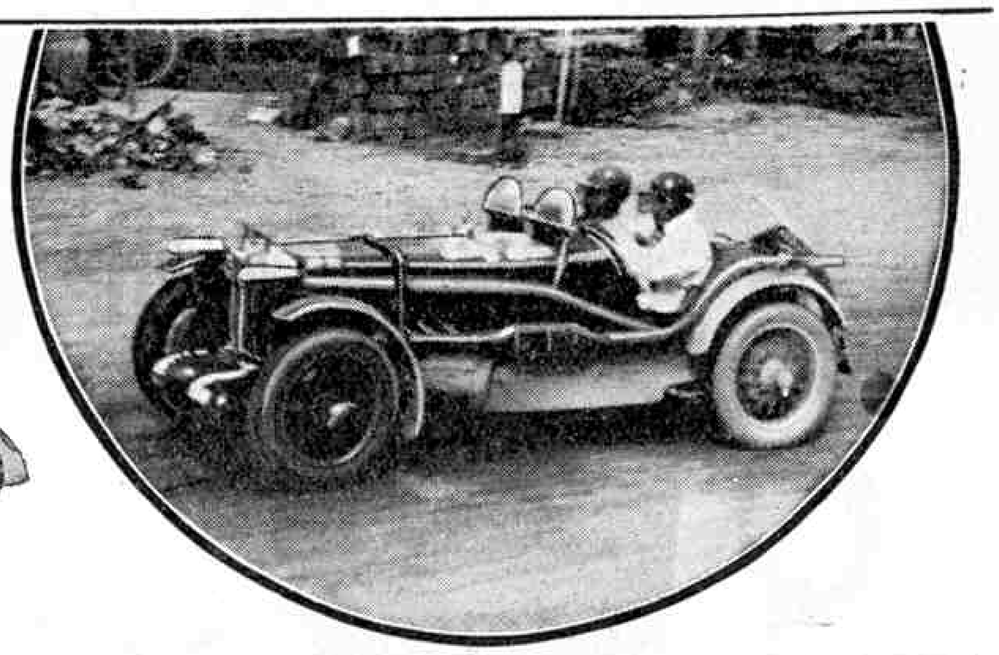
SMALL CARS
Dinky Toys No. 35
Fitted with rubber tyres

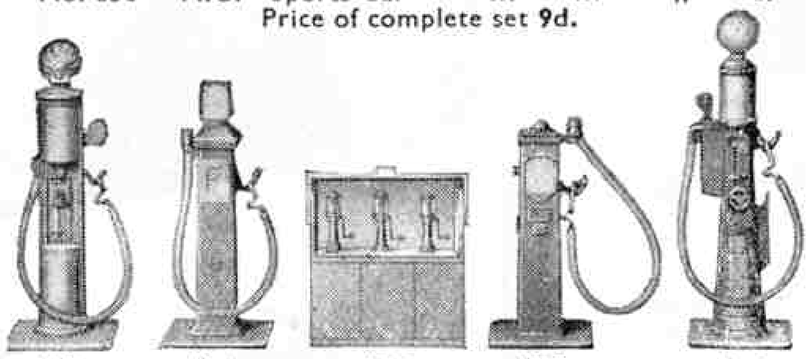
No. 35a	Saloon Car	each	3d.
No. 35b	Racer...	,,	3d.
No. 35c	"M.G." Sports Car	,,	3d.

Price of complete set **9d.**

HOTCHKISS RACING CAR
Dinky Toys No. 23b
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

RACING CAR
Dinky Toys No. 23a
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each





49D 49A 49E 49B 49C

PETROL PUMPS Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Realistically coloured.

No. 49a	Bowser Pump	each	4d.
No. 49b	Wayne Pump	,,	4d.
No. 49c	Theo Pump each **4d.** No. 49d Shell Pump	,,	4d.
No. 49e	Oil Bin (Pratts)	,,	3d.

Price of complete set **1/6**

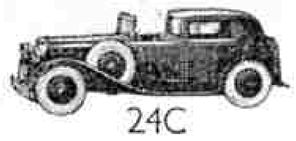
STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

23e

24E

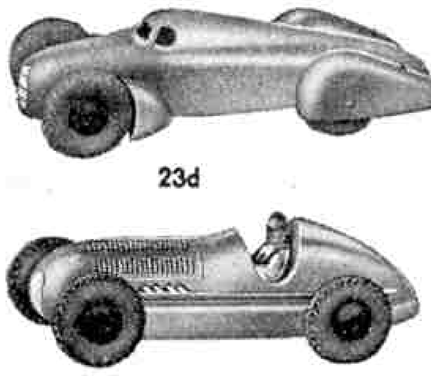
24G

24F

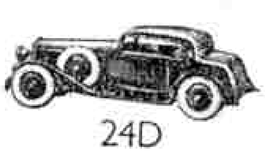


24C

TRAILER
Dinky Toys No. 25g
For use with Dinky Toys No. 25 (Commercial Motor Vehicles). Fitted with detachable rubber tyres. Price **7d.** each



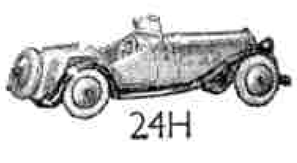
23d



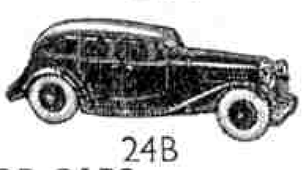
24D

24A

23c



24H



24B

RACING CARS
Dinky Toys No. 23
Fitted with driver and detachable racing tyres. Assorted colours.

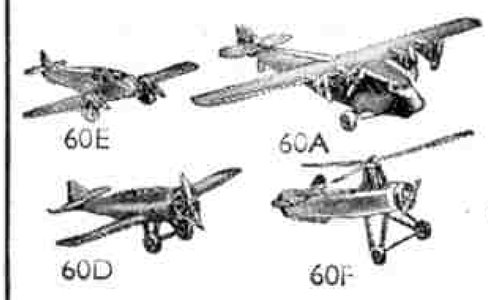
No. 23c	Mercedes-Benz Racing Car	each	8d.
No. 23d	Auto-Union Racing Car	,,	8d.
No. 23e	"Speed of the Wind" Racing Car	,,	8d.

Price of complete set **1/11**

MOTOR CARS
Dinky Toys No. 24
Fitted with detachable rubber tyres and silver-plated radiators

No. 24a	Ambulance	each	9d.
No. 24b	Limousine	,,	9d.
No. 24c	Town Sedan ...	,,	9d.
No. 24d	Vogue Saloon ...	,,	9d.
No. 24e	Super Streamline Saloon	,,	9d.
No. 24f	Sportsman's Coupé	,,	9d.
No. 24g	Sports Tourer (4 seater)	,,	9d.
No. 24h	Sports Tourer (2 seater)	,	9d.

Price of complete set **6/-**



60E 60A 60C 60D 60F 60B

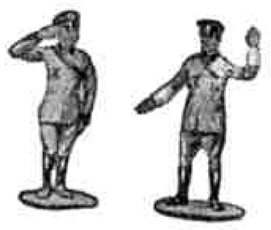
AEROPLANES Dinky Toys No. 60

No. 60a	Imperial Airways Liner	each 9d.
No. 60b	D.H. "Leopard Moth"	,, 6d.
No. 60c	Percival "Gull" ...	,, 6d.
No. 60d	Low Wing Monoplane	,, 6d.
No. 60e	General "Monospar"	,, 6d.
No. 60f	Cierva "Autogiro" ...	,, 6d.

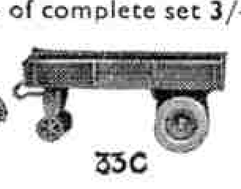
Price of complete set **3/-**

ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
In correct colours. Fitted with detachable rubber tyres.
Price **6d.** each

STREAMLINE BUS
Dinky Toys No. 29b
Fitted with rubber tyres
Price **6d.** each



33A

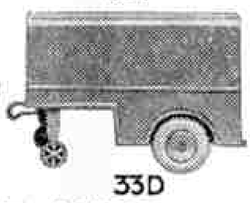


33C

33F

33E

33B



33D

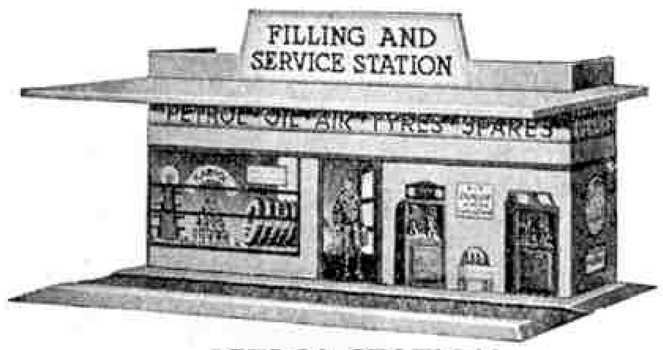
MECHANICAL HORSE AND FIVE ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with detachable rubber tyres

No. 33a	Mechanical Horse ...	each	6d.
No. 33b	Flat Truck	,,	6d.
No. 33c	Open Wagon ...	,,	6d.
No. 33d	Box Van	,,	8d.
No. 33e	Dust Wagon ...	,,	8d.
No. 33f	Petrol Tank	,,	8d.

Price of complete set **3/6**

MOTOR TRUCK
Dinky Toys No. 22c
Assorted colours. Fitted with detachable rubber tyres. Price **6d.** each

BEACON
Dinky Toys
No. 47d
Realistic model of a Belisha Safety Beacon
Price **1d.** each



PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Printed in appropriate colours.
Price **1/6** each

A.A. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 44
Collectors of Dinky Toys will fine this realistic road set of particular interest
Each item is finished in correct co'ours

No. 44a	A.A. Box	each	8d.
No. 44b	A.A. Motor Cycle Patrol	,,	9d.
No. 44c	A.A. Guide directing traffic	,,	3d
No. 44d	A.A. Guide at the salute	,,	3d

Price of complete set **1/11**

MECCANO LTD. — BINNS ROAD — LIVERPOOL 13

Enjoy the company of the World's screen celebrities at *your* Christmas parties

WITH RAY

9.5 mm.

Safety CINE PROJECTORS AND SCREENS

No. 2
21/-

These Cine Projectors are British made in a model factory equipped with the finest machinery that ensures precision and efficiency. The ingenious claw action reduces film wear to a minimum, whilst the synchronised shutter makes the projection flickerless. All models are designed to take 9.5 mm. non-inflammable film and conform with Home Office Regulations. A Ray Projector will give hours of enjoyable and educational entertainment to both young and old.

RAY PROJECTOR No. 1

This Projector is fitted with double claw action, easy-loading gate, and focussing lens. It can be used with a 4.5 volt battery, or direct from the mains with a suitable transformer (Price 8/6), and will project any length of film up to 60 ft. It gives a brilliant and flickerless picture. Packed in strong box with full instructions.

BATTERY MODEL ... ... Price 12/6
MAINS MODEL (A.C. only) ... ... ,, 19/6
Postage 9d.

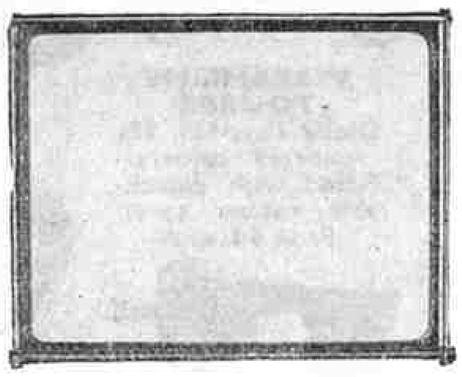
RAY PROJECTOR No. 2

A newly-designed model of superior construction. Fitted with double claw action, with heavy fly-wheel to give smooth running, special synchronised shutter of improved design, and powerful focussing lens system. The lamp-house is separate from the body and is fitted with hinge for inspection. The design is such that the Projector gives a large picture of exceptional brilliance and steadiness. The whole instrument is mounted on a metal base of solid construction giving great rigidity. Projects 30 ft. or 60 ft. films.

It may be run from a 7.5 volt battery, or direct from the mains by using a suitable transformer (Price 9/6). We list below an all mains model (D.C. or A.C.) with adjustable resistance and 12 volt 1 amp. lamp.

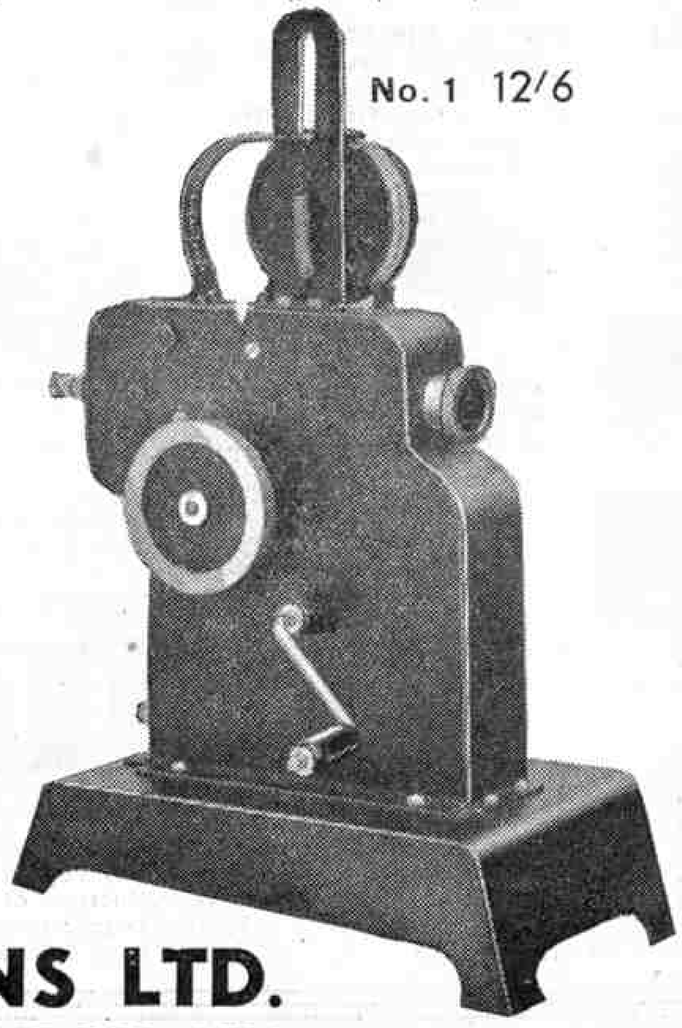
Packed in strong box with full instructions.

BATTERY MODEL ... ... Price 21/–
MAINS MODEL ... ... ,, 29/6
Postage 9d.

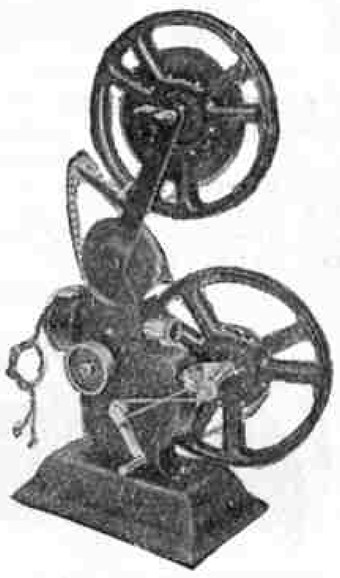


These Screens are suitable for use with all makes of Cine Projectors. The cloth used in their construction is of heavy quality and has a highly reflective non-directional surface. The Screens are mounted on hard wood rollers, and Nos. 2 and 3 are fitted with adjustable stretchers. Each Screen is packed in a strong cardboard box. The gold screens are a new departure giving greater brilliance and more pleasing effects.

			Silver	Gold	Postage
No. 1	24 in. x 18 in.	Price	4/6	5/6	6d.
,, 2	30 in. x 24 in.	,,	10/6	12/6	6d.
,, 3	40 in. x 30 in.	,,	15/6	21/–	9d.



No. 1 12/6



RAY SUPER ATTACHMENT

This Attachment, which can be fitted by any Meccano boy in a few moments, is for use with a No. 2 Ray Projector. It makes possible the projection of 300 ft. lengths of film. These films can be purchased or hired from any dealer, and there is a host of entertaining and educational subjects from which to choose.

The Super Attachment is easily fitted to the Ray Projector No. 2 by following the instructions sent out with it. It is supplied complete with one 300 ft. spool (the second spool being suppied with the film purchased or hired).
Price 17/6. Postage 6d.

FILMS

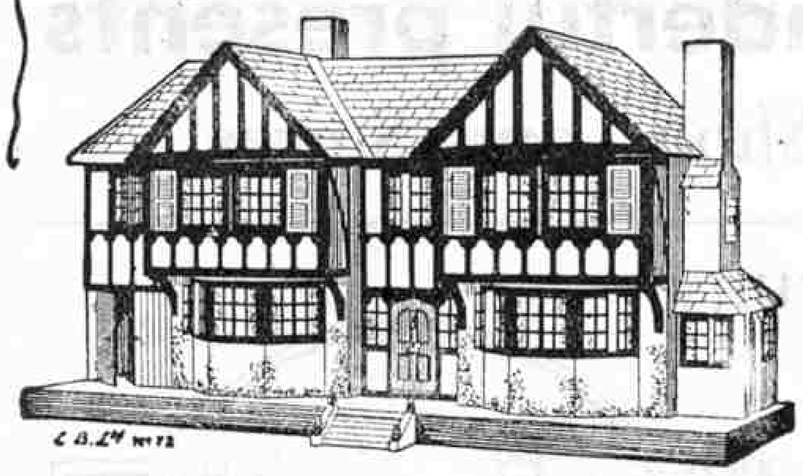
Popular Subjects : Drama, Humour, Mickey Mouse, etc.

10 ft. ... ... 1/- each
15 ft. ... ... 1/6 ,,
30 ft. ... ... 3/6 ,,
60 ft. ... ... 6/- ,,
Postage 2d.

CAMERA PRODUCTIONS LTD.

3, ALFRED PLACE, LONDON, W.1

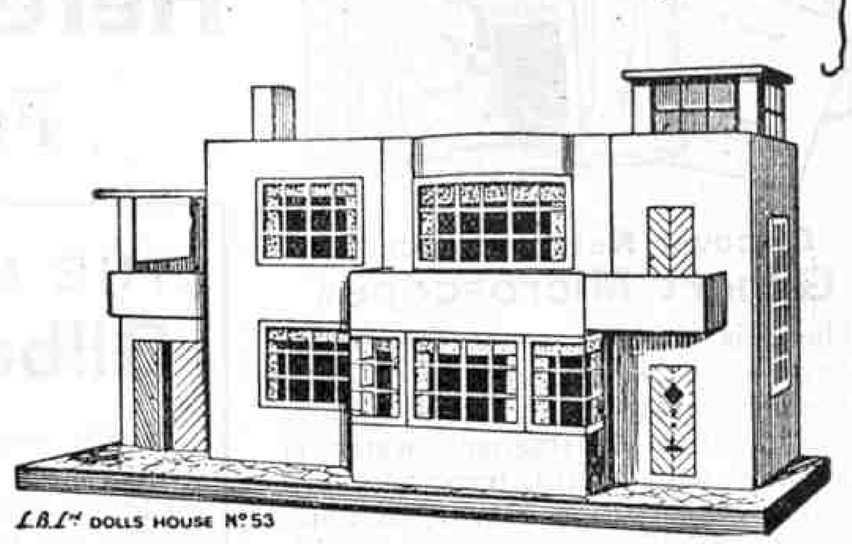
TRIANG TOYS



DOLL'S HOUSE No. 72. Fashionable Tudor design. Half-timbered gables and front. Built-in garage with opening doors. Two bedrooms, dining room, bathroom and kitchen, with dummy range, dresser and sink. Four ELECTRIC wall lights with switches. Red tiled roof. Steps and dummy shrubs. Length 47¼ ins. Price **59/6**

Smaller models **29/6** and **39/6**

24/D DOLL'S PRAM. Streamline boatshape body, nicely upholstered. 7 in. tangent spoke wheels, 1 in. cushion tyres, two pair dressguards and footbrake. All bright parts including levers CHROMIUM PLATED. Length of body 24 ins. Price **42/-**



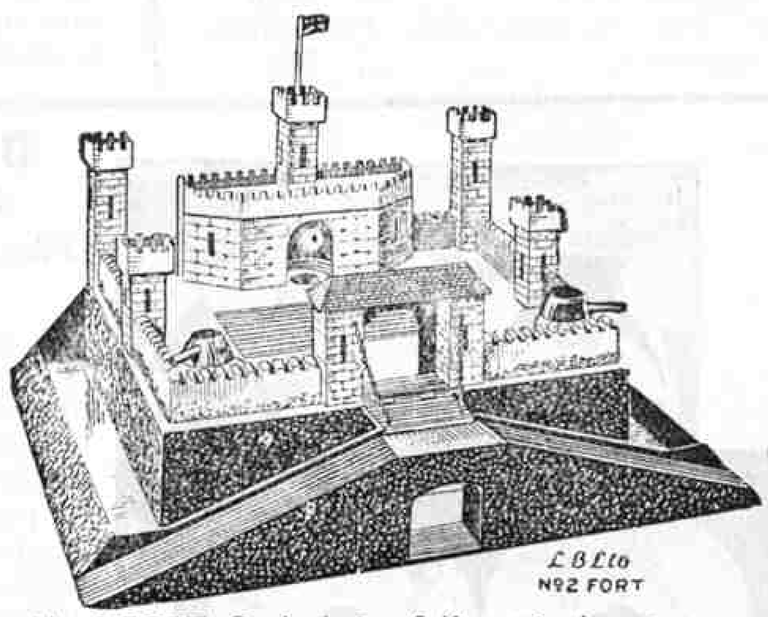
DOLL'S HOUSE No. 53. Four large rooms, fitted with electric wall lights. Metal framed windows. Kitchen fitted with dummy gas stove, sink and dresser. Built-in garage. Movable suntrap. Finished in cream and green, with imitation crazy paving. Length 42 ins. Price **55/-**

Smaller models **10/6**, **17/6** **25/6** and **42/-**

No. 2 THEATRE. Electric footlights and spotlight. Roll-up velvet curtain. Two specially written plays with stage directions. Finished in black and silver. Length 20 ins. Price **21/-**

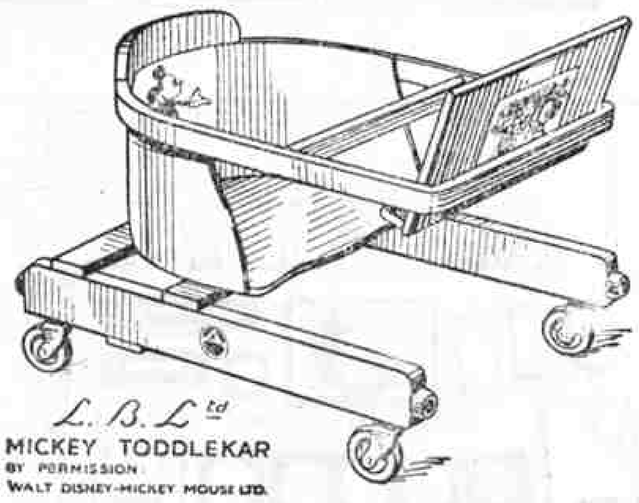
Other models **10/6**, **35/-**. EXTRA Plays and scenery **2/-** each.

22/W DOLL'S PRAM. Very smart boatshape, nicely upholstered. Laced hood, long levers, 6 in. tangent spoke wheels, ⅝ in. tyres. Two pair dressguards and footbrake. Length of body 22 ins. Price **27/6**

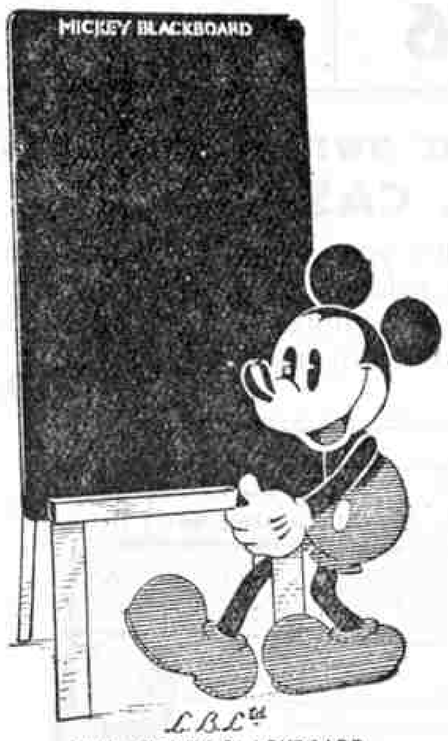


No. 2 FORT. Castle design. Self-contained moat, ramps, drawbridge and flagstaff. Two spring model cannons. Fitted with electric light, battery extra. Price **8/11**

Other models **6/11**, **12/6**, **21/-**

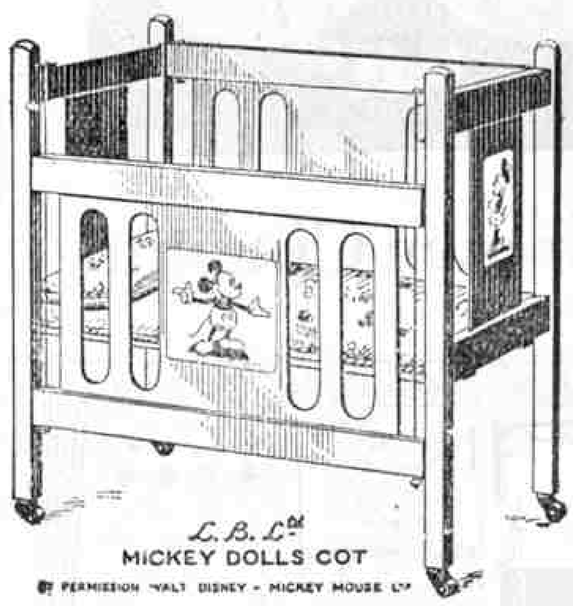


MICKEY TODDLEKAR. A novel idea in which the tray lifts up forming a little blackboard. Nicely finished in colours and fitted with rubber tyred castors. Height of seat 6 in. Price **7/6**

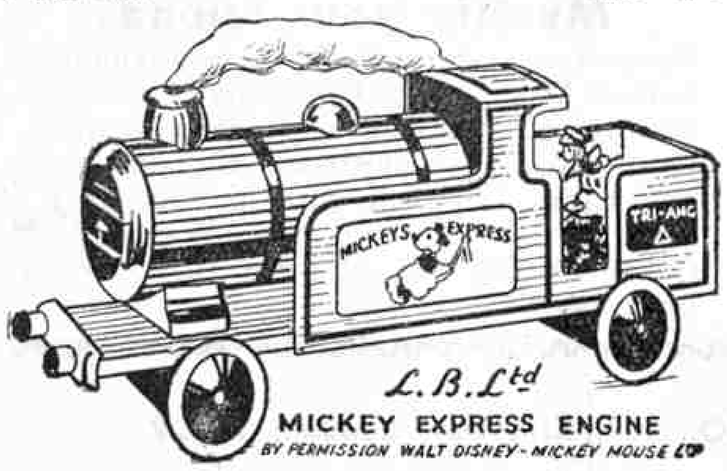


No. 12 MICKEY BLACKBOARD. A novel and amusing blackboard complete with cut out MICKEY. Easel is finished in cellulose enamel and Mickey in bright colours. Height 42½ ins. Price **12/6**

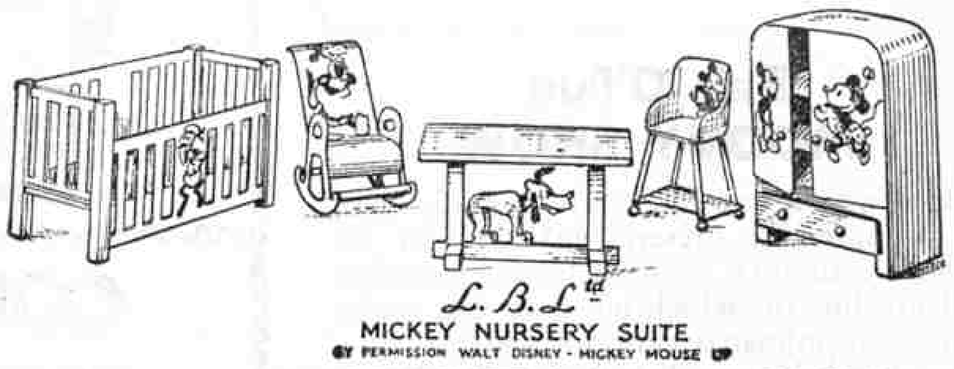
Ask your dealer for the Tri-ang Toy coloured leaflet.



MICKEY DOLL'S COT. Exceptionally well made, drop side, nickel-plated fittings, strong castors, well stuffed mattress and bolster. Finished in washable cellulose colours. Length 20½ ins. Price **7/6**



MICKEY EXPRESS ENGINE. One hundred smiles an hour with Mickey! Fitted with four steel disc wheels and rubber tyres. Complete with imitation smoke. Length 20 ins. Price **5/-**



MICKEY DOLL'S NURSERY SUITE. A charming set of Doll's House Furniture including Cot with dropside, Rocking Chair, Table, High Chair and Cupboard. Packed in a handsome box. Price **7/6**

MADE BY **LINES BROS. LTD., Tri-ang Works, LONDON, S.W.19**

GILBERT TOYS

Here are some wonderful presents

From all good Toy Shops and Stores

Discover Nature's secrets
Gilbert Microscopes

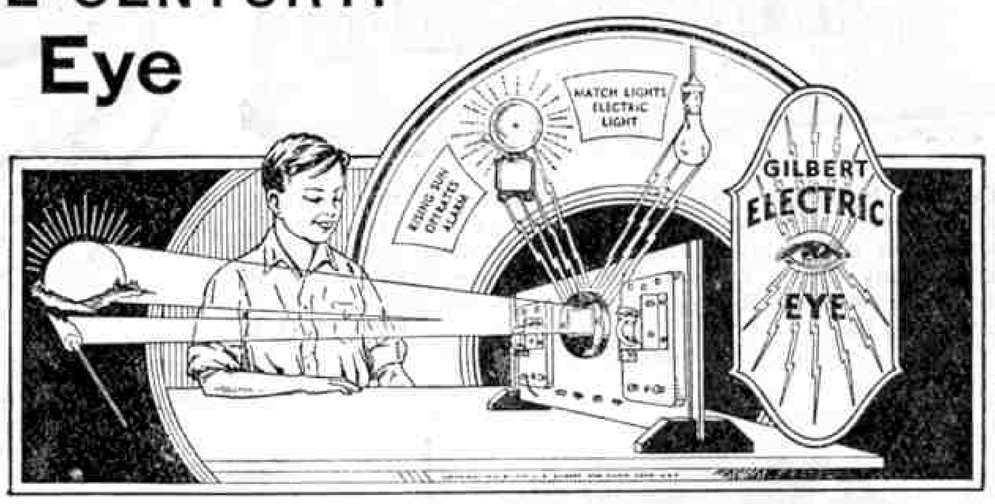
There is nothing more fascinating than to see Nature's secrets revealed through a microscope. Do you know that a drop of stagnant water is teeming with weird, ferocious life? Gilbert Microscope No. 1, as illustrated, magnifies 50 times approx. with sharp definition. Complete with accessories and instructions. **5/-**

Set No. 3 (magnifies 75 times approx.) **12/6**

Set No. 5 (magnifies 150 times approx.) **25/-**

THE MARVEL OF THE CENTURY!
Gilbert Electric Eye

Here's one of the most amazing inventions the world has seen. The Electric Eye is scientifically known as a Photo-Electric cell. Astounding things can be done with it—bells rung, electric light and radio switched off or on almost miraculously, your electric trains controlled with a wave of the hand, crowds counted. Simple. Fascinating. Instructive. Nothing to go wrong. **25/-**



BELIEVE IT OR NOT

Fascinating!
Instructive!

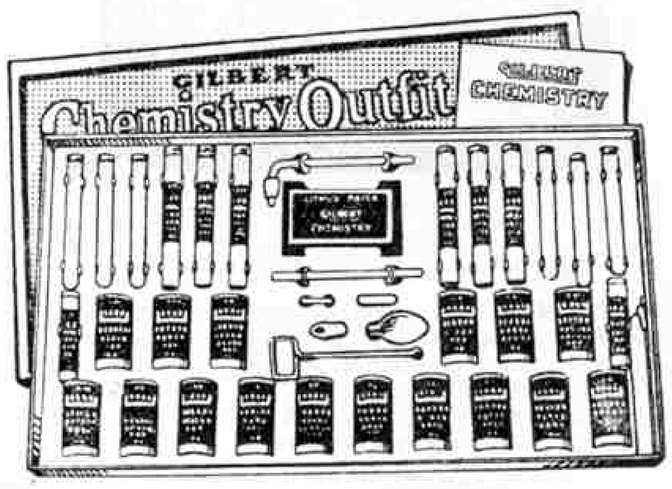
An entertaining way to add to knowledge. This toy challenges you with questions arranged by Ripley of the Sunday Express. The queries seem incredible, and the answers, automatically picked out by electric light, are amazing and true. An ideal party game, giving endless amusement. **2/6**

Be a Chemist! It's fun!

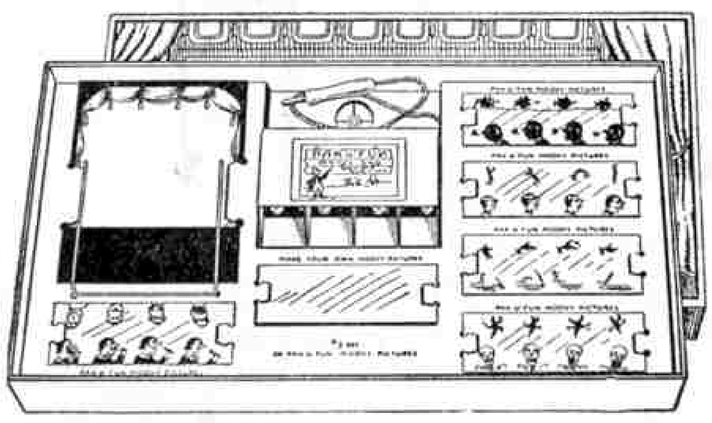
The world needs chemists! A Gilbert Chemistry Outfit may mean the beginning of a big future for you. It enables you to make scientific experiments and do lots of fascinating tricks. Outfit No. 1 contains chemicals, apparatus and instructions for over 100 experiments. **3/6**

Outfit No. 3 as illustrated, more advanced, **7/6**

Other outfits—real laboratories, up to **84/-**



Your own Cinema!

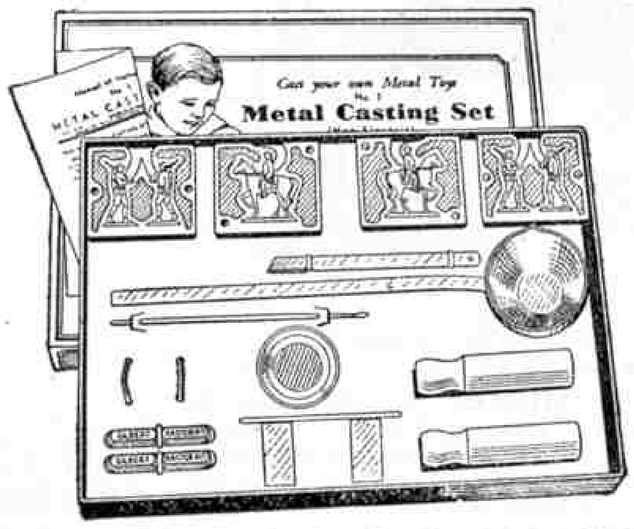


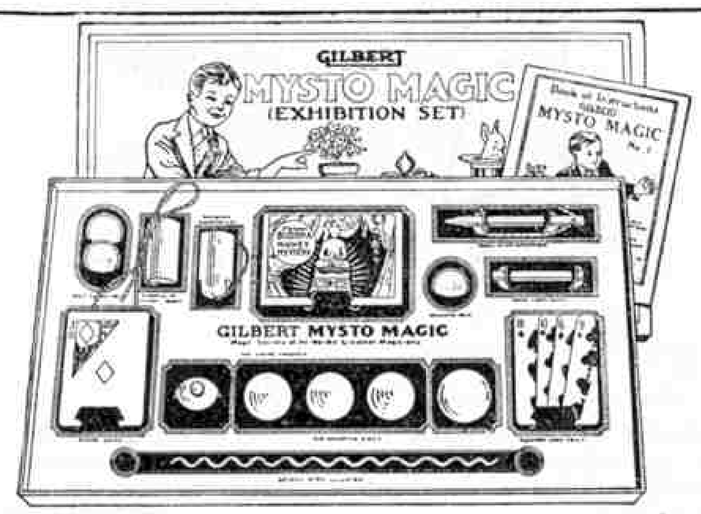
Pak O'Fun
MOOVY SHOW

How would you like your own cinema? This splendid present enables you to show your own movies. It also contains plain films on which any boy can make his own animated cartoons—just as you see at real cinemas. It is the simplest home cinema ever made. No mechanism to go wrong, absolutely safe—uses pocket lamp batteries. Complete with screen and 12 films, including blanks for making your own films. Price **5/-**

Make your own Metal Toys
METAL CASTING SET

This toy enables you to make your own badges, models, soldiers, guns, whistles, etc. Simple to use. Absolutely safe. Complete with supplies of lead, moulds, ladles, etc. Price **7/6**





Mystify your friends

Haven't you often wanted to be a conjurer? Gilbert Mysto-Magic Conjuring Sets contain mystifying tricks that are simple to perform. Outfit No. 1 as illustrated contains many new tricks. Complete with instructions. Price **5/-**

Other Outfits, No. 3, price **10/6**, No. 4, price **12/6**.

COUPON Cut out and post to: THE A. C. GILBERT CO., 109, Kingsway, London, W.C.2

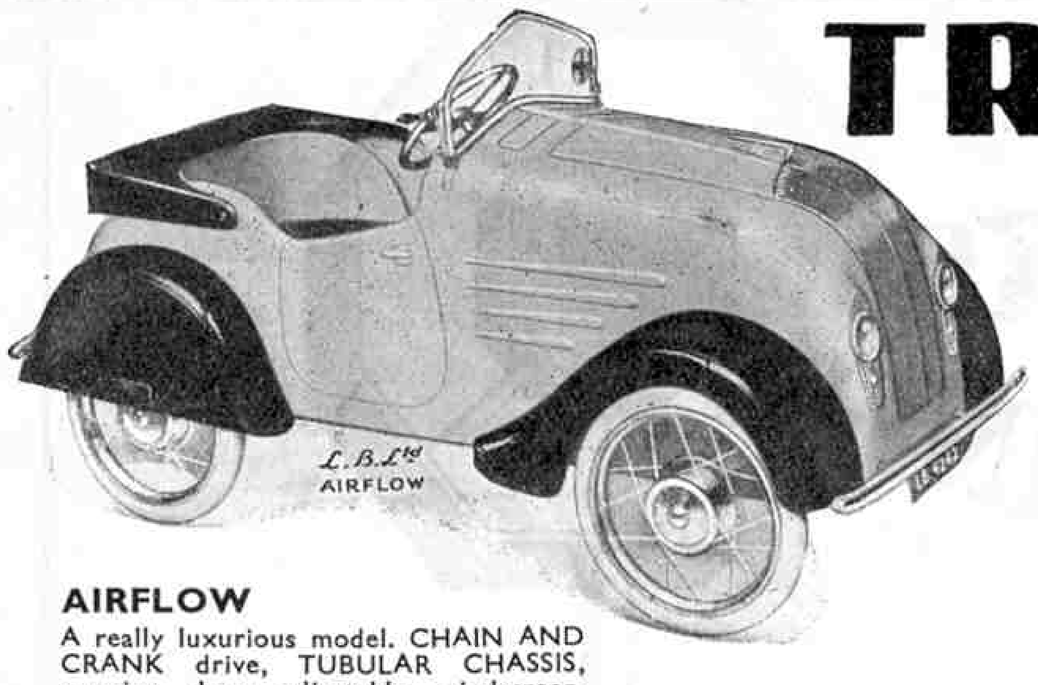
Please send me your new coloured catalogue describing all the latest Gilbert toys.

Name .....

Address .....

M.M. 12 .....

TRI-ANG

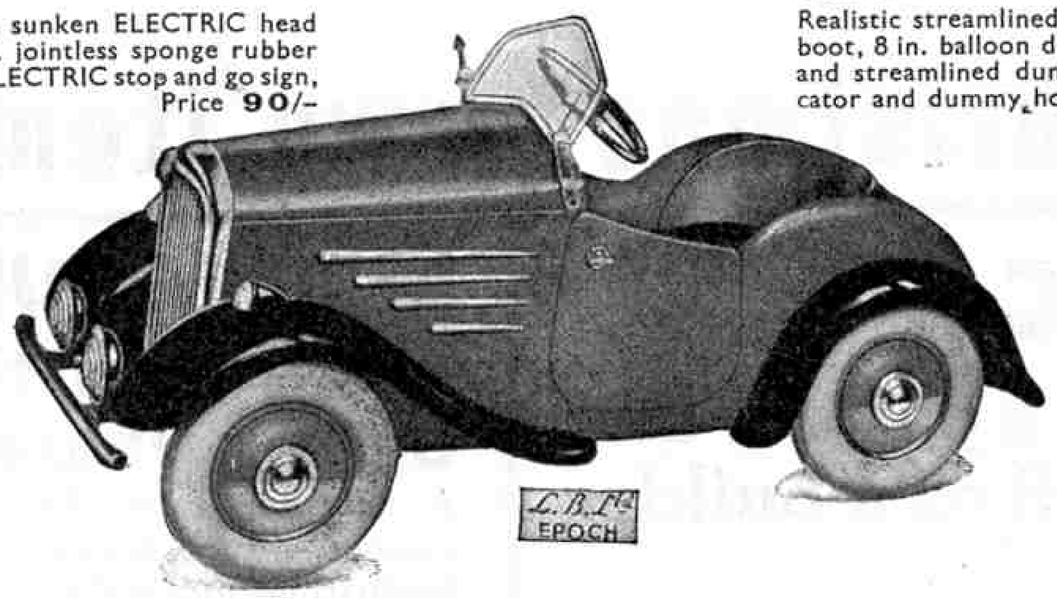


AIRFLOW

A really luxurious model. CHAIN AND CRANK drive, TUBULAR CHASSIS, opening door, adjustable windscreen, tubular bumpers, facsimile Airflow radiator, sunken ELECTRIC head lamps, tangent spoke wheels, 10 in. x 1⅛ in. jointless sponge rubber tyres. CHROMIUM-PLATED hubs and rims. ELECTRIC stop and go sign, also buzzer horn. Length 45 ins. Price **90/-**

TRI-ANG SPORTS

Realistic streamlined model, with opening side door and luggage boot, 8 in. balloon disc wheels, ½ in. rubber tyres, plated bumper and streamlined dummy side lamps, windscreen, direction indicator and dummy hood. Length 41 ins. Price **32/6**



EPOCH

Very modern design, latest type radiator, side door, adjustable windscreen, tubular bumper, four dummy lamps (two head and two side), 9 in. balloon disc wheels, ⅝ in. rubber tyres, ball bearing back axle. Length 45 ins. Price **49/6**

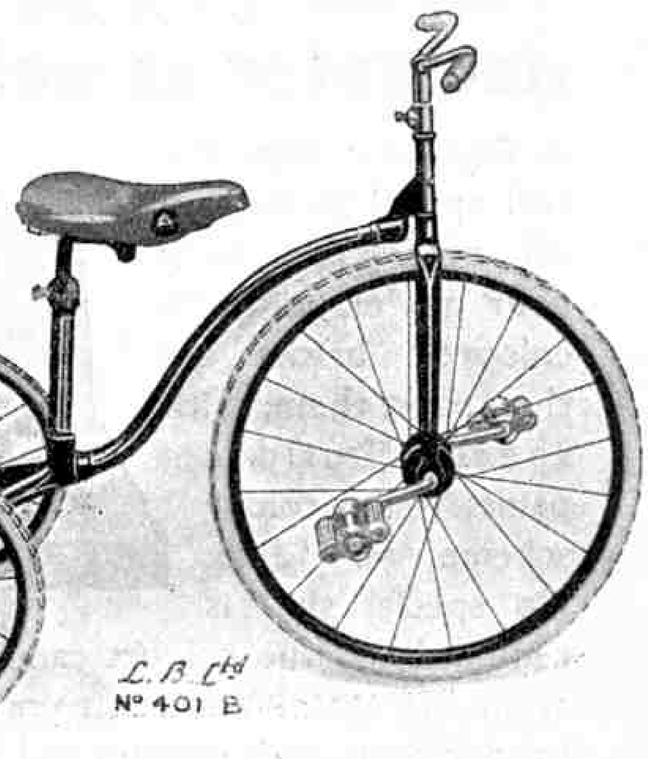
D SCOOTER

Strong steel frame with back rest, nickel-plated handles with rubber grips, 8½ in. dia. tangent spoke wheels, 1 in. cushion tyres. Hardwood step varnished, and frame enamelled red. Price **9/6**

Other models **7/11, 15/-, 17/6, 19/6, 22/6, 37/6, 49/6.**

L. BROS. LTD. LONDON
ENGLAND

REGD. TRADE MARK



TRI-ANG JUNIOR TRIKE No. 401B

Strong cycle tube frames, enamelled black, gold lines, adjustable saddle, thick white auto tread tyres. Nickel-plated fittings. Price **21/-**

Ask your good toy dealer for the handsome Tri-ang Toy coloured leaflet.

TRI-ANG "FAIRYCYCLE" (Regd.) MODEL No. 2

Tubular frame, 14 in. wheels, 1⅜ in. grey imitation pneumatic tyres, ball-bearing pedals, rim brake, two-coil saddle, chain cover, stand. CHROMIUM-PLATED FITTINGS. Black, blue or maroon. Price **39/6**

Other models **29/6, 49/6, 55/-, 59/6, 75/-, 99/6.**

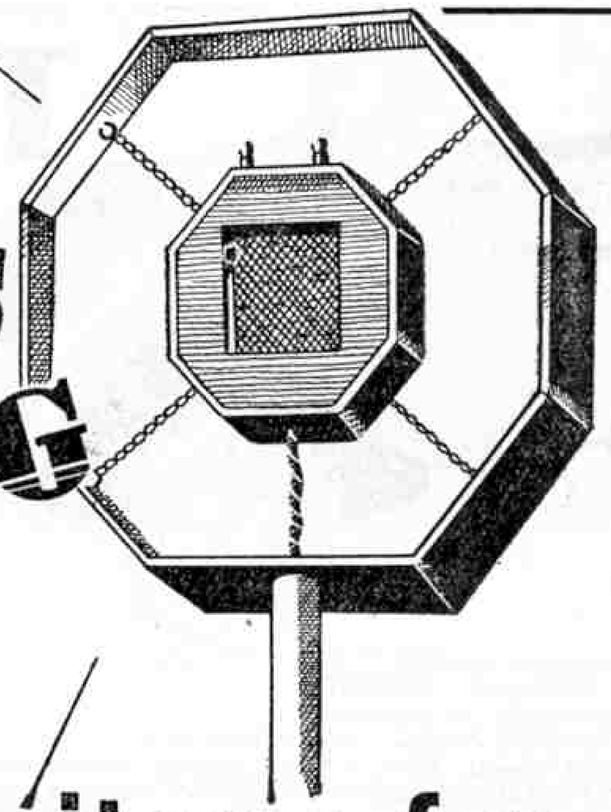
TRI-ANG TRICYCLE No. 5 (Regd. Trade Mark)

FITTED WITH REAR MUDGUARDS, cycle chain drive with free-wheel, frame best quality weldless cycle tubing, 14 in. wheels, 1⅜ in. jointless sponge-rubber tyres, rim brake, coil-spring saddle. CHROMIUM FITTINGS. Black or blue. Price **59/6**

Other models **35/-, 39/6, 45/-, 49/6, 63/-, 67/6, 90/-.**

Made by LINES BROS. LTD., Tri-ang Works, LONDON, S.W.19

LOTT'S BRICKS ANNOUNCING

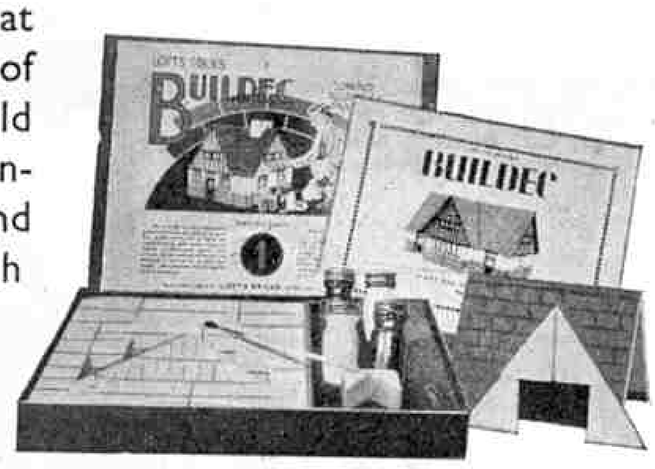


3 Great Christmas news items for boys

1. BUILDEC

You can now be a painter and decorator as well as a builder

A fine new idea that will appeal to boys of **all** ages. You build your models with uncoloured bricks and then paint them, with special Buildec paints, to any colour scheme you like. No special skill is required and the colours can be washed off for painting again and again. You can paint your railway buildings in proper company's colours and by periodical redecoration make sure they are always bright and clean.



Box 1, plans for 12 models, 4 paints and brush ... **3/6**
Box 2, plans for 24 models, 6 paints and brush ... **6/–**
Box 3, plans for 36 models, 8 paints and brush ... **10/6**

2. NEW TUDOR BLOCKS

More realistic Buildings and better value

A new series of bricks with charming half-timbered designs, quaint brickwork and lattice windows, to build fascinating and realistic cottages, manors, etc., in true Tudor style, with plans for many more models.

Box 1. 18 models ... **2/6**
Box 2. 36 models ... **5/–**
Box 3. 54 models ... **7/6**
Box 4. 72 models ... **10/–**
Box 5. 90 models ... **15/–**
Box 6. 96 models ... **21/–**

3. GREAT REDUCTIONS in prices of LOTT'S BRICKS and LODOMO

NEW REDUCED PRICES

LOTT'S BRICKS. Original Series.

Box 0. 6 models **1/6**
Box 1. 30 models **3/11**
Box 2. 48 models **7/11**

Also larger Sets at **15/–, 21/–, 27/6**

LODOMO with windows, doors and bonded brickwork.

Box 1. 18 models **3/–**
Box 2. 50 models **6/6**
Box 3. 72 models **10/6**

LOTT'S CHEMISTRY

Box 5 21/–

These outfits will give you endless pleasure—scores of exciting experiments—a "lab" of your very own!

Each set contains chemicals, apparatus and a fine book of instructions by a Doctor of Science. All experiments and reactions are clearly explained.

Box 1. 42 Experiments **3/6**
Box 2. 80 Experiments **6/–** Box 3. 131 ,, **10/6**
Box 4. 181 Experiments **15/6** Students' Wall Cabinets, **73/6** and **105/–**

LOTT'S ELECTRICITY

The sets contain everything necessary for demonstrating the principles of magnetism, current and static electricity. You can also perform many fascinating experiments in telegraphy, signalling and electro-plating and make actual working models of many electrical instruments.

Box 1. 42 Experiments **6/–**
Box 2. (with Leclanche batteries) 84 Experiments **12/6**
Box 3. 126 Experiments **21/–**

Lighting sets containing Leclanché batteries for floodlighting and illuminating models, etc., **5/–** and **7/6**

Write for Free Illustrated Catalogues including Chemistry Spares List to Dept. M.M.

LOTT'S BRICKS LTD., WATFORD, HERTS., ENGLAND.

Harness *Steam* to the models you build this Christmas

All Mersey Model productions are the work of expert British craftsmen and are tested under power before they leave the works. Every model is guaranteed. There are twelve different models, the prices of which range from 10/6 to 47/6. Build these engines into your Meccano models and get more fun. Full particulars of our range are contained in our list, copy of which will be sent on request.

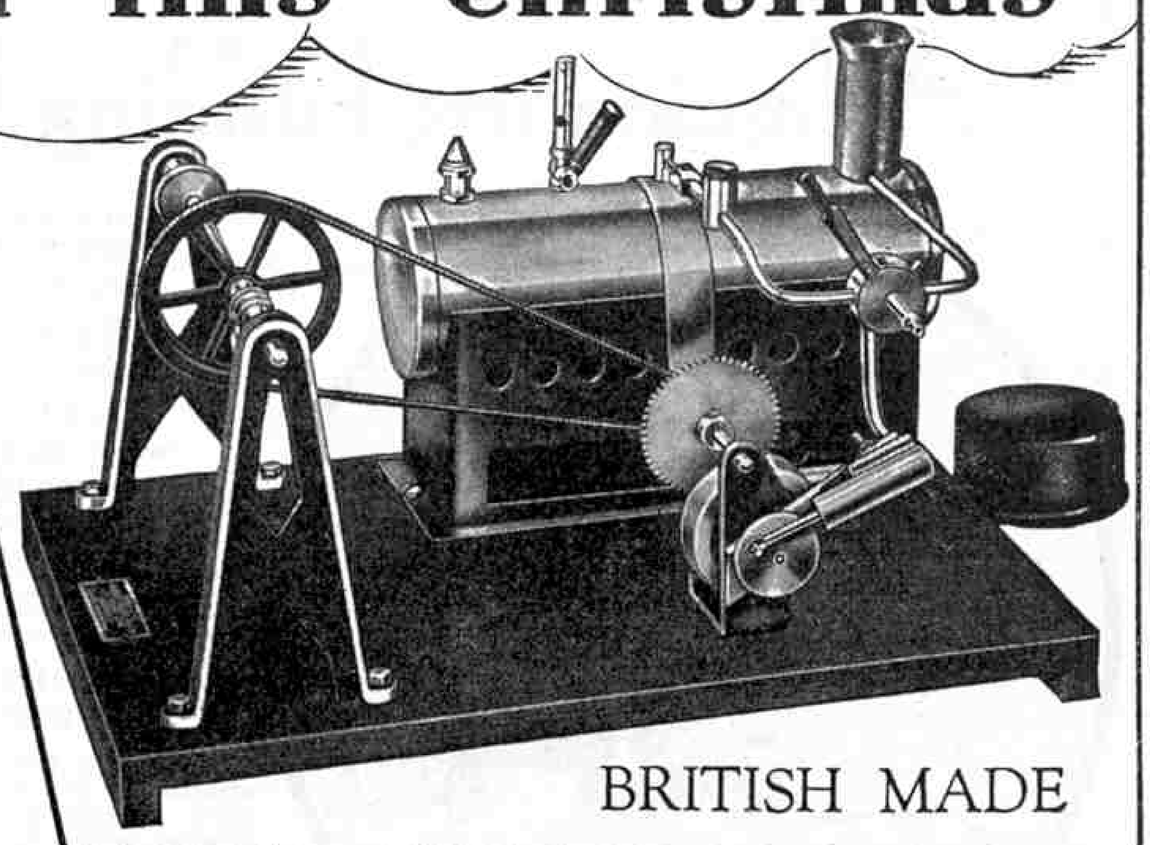
The model illustrated is 53GR. As in the case of all our models, it has lacquered brass boiler, solid drawn tube, tested to 115 lbs. per sq. in. Exhaust through chimney; packed piston; maximum speed over 1,000 r.p.m. It is fitted with reversing valve and speed control lever, safety valve, whistle and displacement lubricator. Drive by spring cord, with two speeds—direct, and from 3½ : 1 reduction gearing—to countershaft. Mounted on polished wood baseboard (7 × 10½ in.), complete with four-wick unspillable lamp, filling funnel, and measure. Price 32/6.

PRICES OF OTHER MODELS

No. 51	10/6	No. 53 Reversing	27/6
No. 52	16/6	No. 55 Three-cylinder	42/6
No. 52 Reversing	21/6	No. 55 " Reversing	47/6
No. 53	22/6	Speedboat Power Plant	12/6

Mersey Models are obtainable from the big stores (in London: Gamages, Hamleys and Selfridges, etc.), and from all the best toy shops. Ask us for name of your local dealer.

MERSEY MODEL CO. LTD.,
Cooper's Buildings, Church St., Liverpool 1



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Beware of Imitations!
Every Mersey Model bears our name plate, without which none is genuine.

"The very thing for Peter!"

THINK he'll like it? We've still to meet the fellow who didn't! The 'Bessa' is so simple to use and you take snaps with it from eye-level (like the press-photographers). Held this way, rock-steady, there's no fear of shakiness or vibration spoiling the picture. Cheap to run, too; the 'Bessa' takes 16 half-size or 8 full-size pictures on the standard 8-exposure film. And remember—the hint-dropping season opens TO-DAY!

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with 'Ever Ready' *electric* cycle lamps. They spell convenience and safety at a cost of less than ½d. an hour for the front lamp and 1/10th penny for the rear lamp. *Obtainable everywhere.*

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A fascinating building hobby for boys and girls

Simplicity is the keynote of this new building system, by means of which the youngest children can build all kinds of models with the greatest of ease—Towers, Bridges, Coaches, Houses, Wheel Toys, Windmills and scores of others.

The parts are beautifully enamelled in striking colours, giving a charm and distinction to the models that is outstandingly attractive.

Dinky Builder Plates are hinged on all sides, with intervening spaces so that when two are placed side by side the hinged part of one Plate fits into the corresponding space in the other. The two plates are then locked by inserting a rod. Nuts and bolts are not required.

No. O DINKY BUILDER OUTFIT

This Outfit contains a good assortment of Dinky Builder parts (including two road wheels), with which a splendid range of models can be built. The Instruction Folder included gives examples of 40 models, but many others of an original character may be constructed by the inventive boy or girl.

Price **2/6**

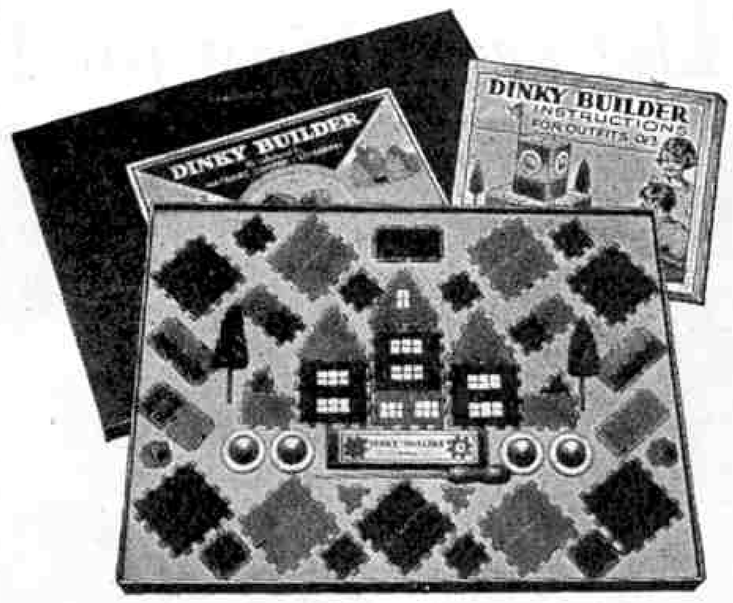
No. O Dinky Builder Outfit
Price 2/6

No. 1 DINKY BUILDER OUTFIT

This splendid Outfit contains a varied selection of parts, including a set of four road wheels for constructing miniature wheel toys. The Instruction Folders included show a total of 92 fine models, including 8 that feature the new parts with windows. Price **4/11**

No. 2 DINKY BUILDER OUTFIT

The No. 2 Dinky Builder Outfit contains a fine selection of parts with which all the No. O and No. 1 Outfits models can be built. In addition, the parts in this fine Outfit make possible the construction of seven groups of miniature model furniture and 20 other wonderful models featuring the new parts with windows. Full instructions for building the complete range of models are given. Price **7/9**

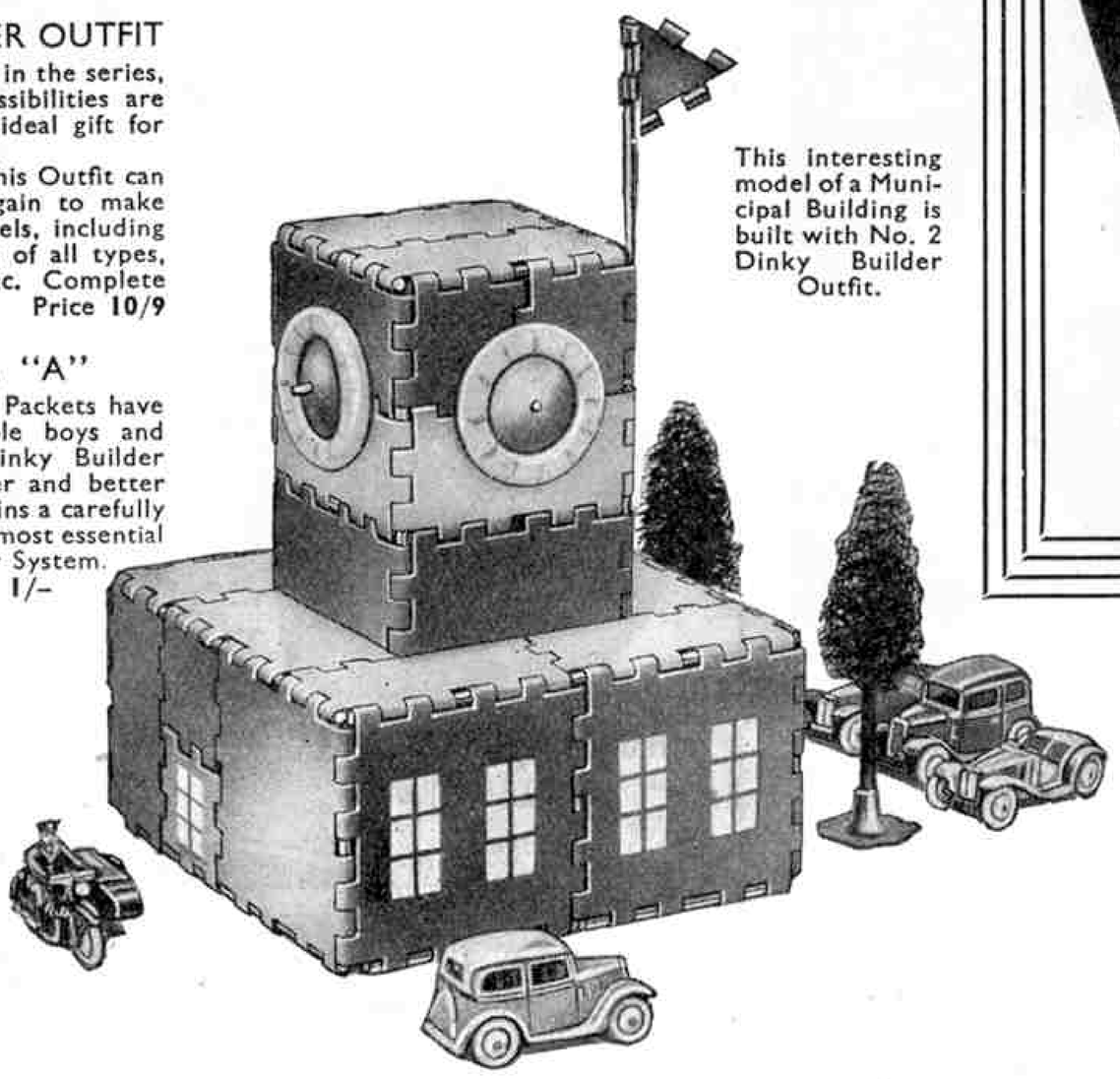


No. 3 Dinky Builder Outfit
Price 10/9

No. 3 DINKY BUILDER OUTFIT

This is the largest Outfit in the series, and its model-building possibilities are almost limitless. It is the ideal gift for young boys and girls.

The parts contained in this Outfit can be used over and over again to make hundreds of different models, including Towers, Bridges, Buildings of all types, Furniture, Aeroplanes, etc. Complete instructions are provided. Price **10/9**



This interesting model of a Municipal Building is built with No. 2 Dinky Builder Outfit.

DINKY BUILDER "A"

The Dinky Builder "A" Packets have been introduced to enable boys and girls to enlarge their Dinky Builder Outfits and so build bigger and better models. Each packet contains a carefully selected assortment of the most essential parts in the Dinky Builder System.

Price **1/-**

PRODUCT of MECCANO LIMITED LIVERPOOL

The addition of Dinky Toys Motor Cars, Animals, Figures, Trees, etc., greatly increases the realism and attractiveness of Dinky Builder Models, and extends the fun tremendously.

Ask your dealer for a copy of the latest price list of Dinky Toys in which the complete range of these fascinating miniatures is fully illustrated.

MANUFACTURED BY

MECCANO LTD. — BINNS ROAD — LIVERPOOL 13

Four easy to build **FROG** flying scale-model constructional kits

De Havilland "LEOPARD MOTH" 2′6
Wing Span 12¼ ins. Length 9½ ins.

De Havilland "HORNET MOTH" 3′6
Wing Span 11 ins. Length 9½ ins.

Hawker "DEMON" 2-seater fighter 4′6
Wing Span 12¼ ins. Length 11 ins.

Miles "HAWK MAJOR" 10′6
A super model. Wing Span 16½ ins. A step-up gear box is supplied with this kit.

A CONSTRUCTIONAL KIT 1′-
for a geared-up winder for use with these models. Geared-up Winder mechanism is completely assembled.

These construction kits enable the enthusiast to build his own Flying Scale Models. They are easy to build and no tools are required. All parts are blanked out and fit together perfectly, only needing to be glued. (This is supplied.) Wire parts are already bent to shape. No paint is required, all coverings are printed in the correct colours. Supplied complete with motor lubricant and spare motor.

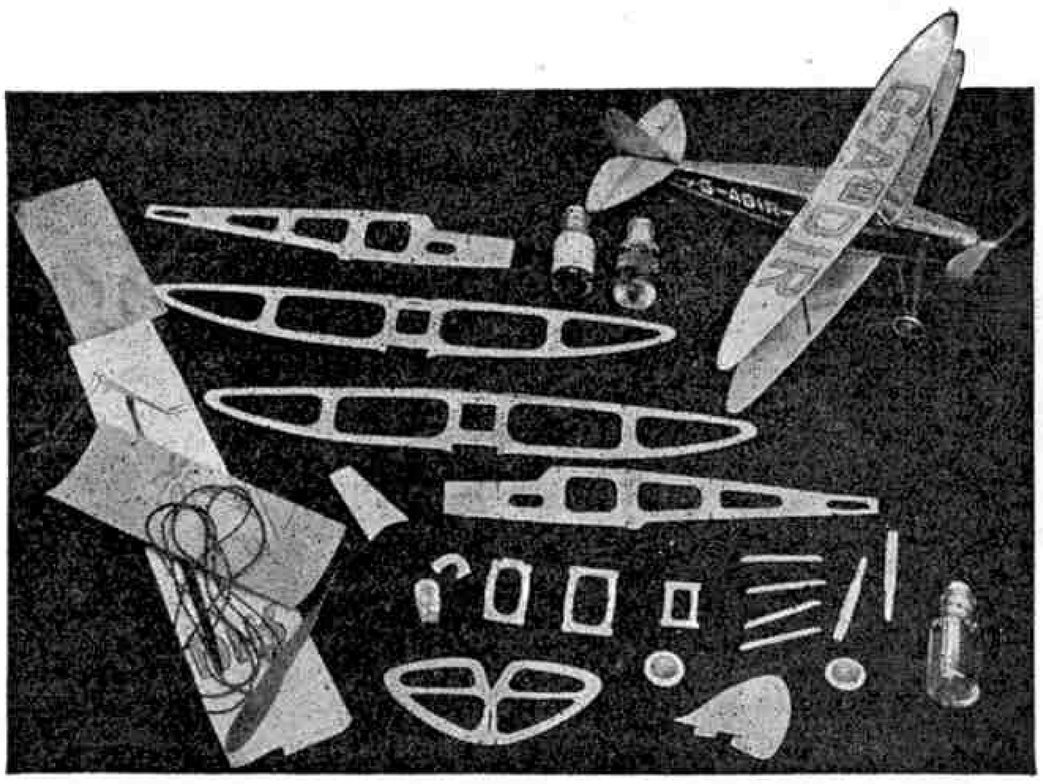


Illustration shows the "Hornet Moth" kit of parts.

EASY TO BUILD NO TOOLS REQUIRED ALL PARTS CUT TO SHAPE

FROG TRADE MARK REGD.

This model won the "WAKEFIELD CUP"

You can build one for yourself

To the enthusiastic model builder this kit provides the opportunity for constructing a machine capable of long duration flights. All the Balsa Wood parts are CUT OUT and a carved airscrew with free wheel mechanism and tensioner device is provided. All wire parts are bent to shape and soldered where necessary. The outfit includes all dope, glue, etc., and full sized working drawings. International Model Aircraft Ltd. have purchased the exclusive world rights of this model and are making the kits under the personal supervision of Mr. Judge, the designer-pilot of the Wakefield Cup winner.

During the Contest this machine flew over 8 Minutes

PRICE 30′-

Wing area 196 sq. ins.
Total weight 4¾ ozs.

FROG MODEL AIRCRAFT

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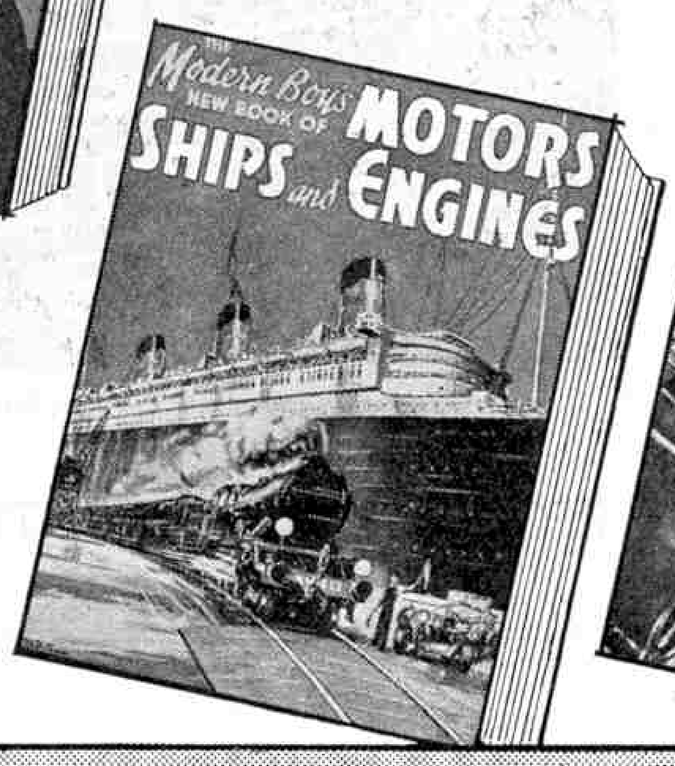

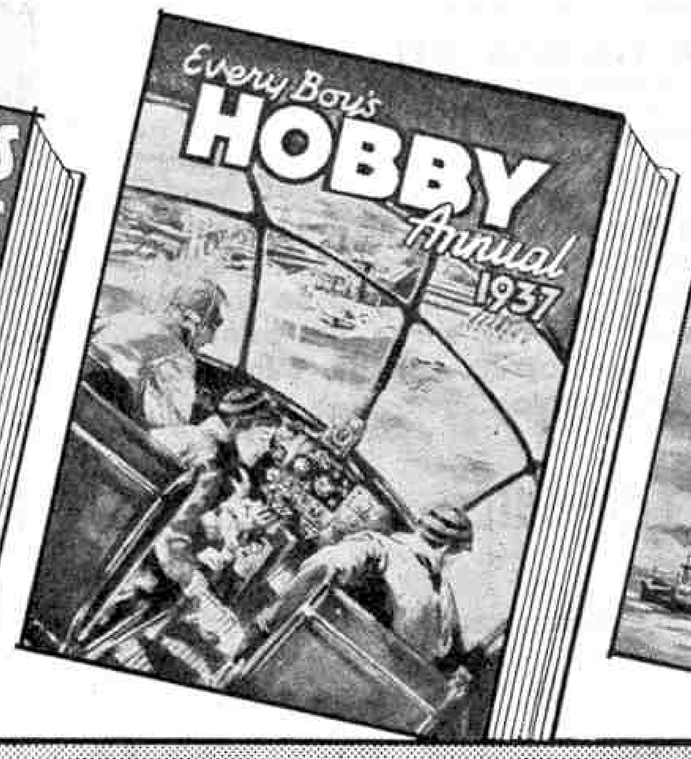

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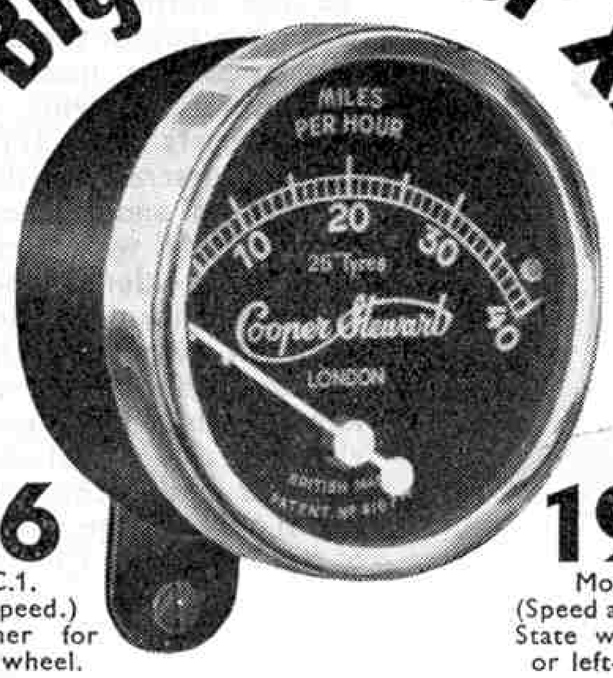

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(Registers Speed.)
State whether for 26″ or 28″ wheel.

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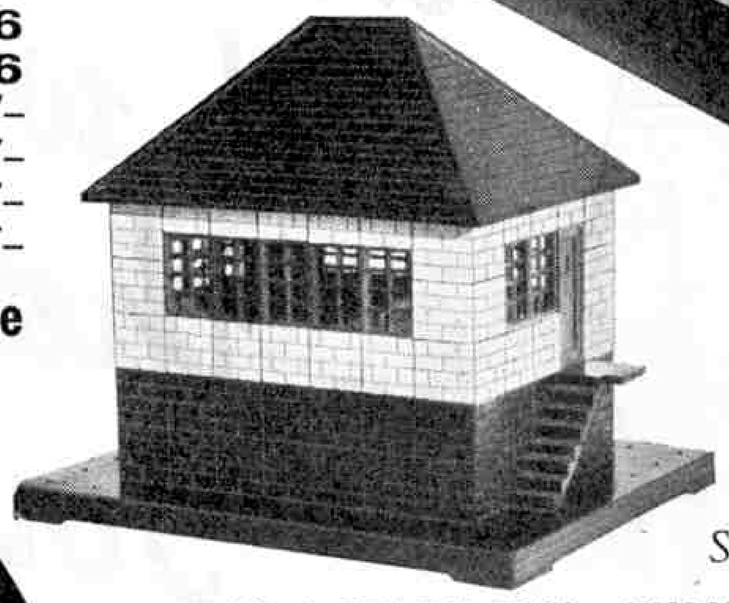

The "BAYKO" No. 3 Set

Signal Box, No. 2 Set

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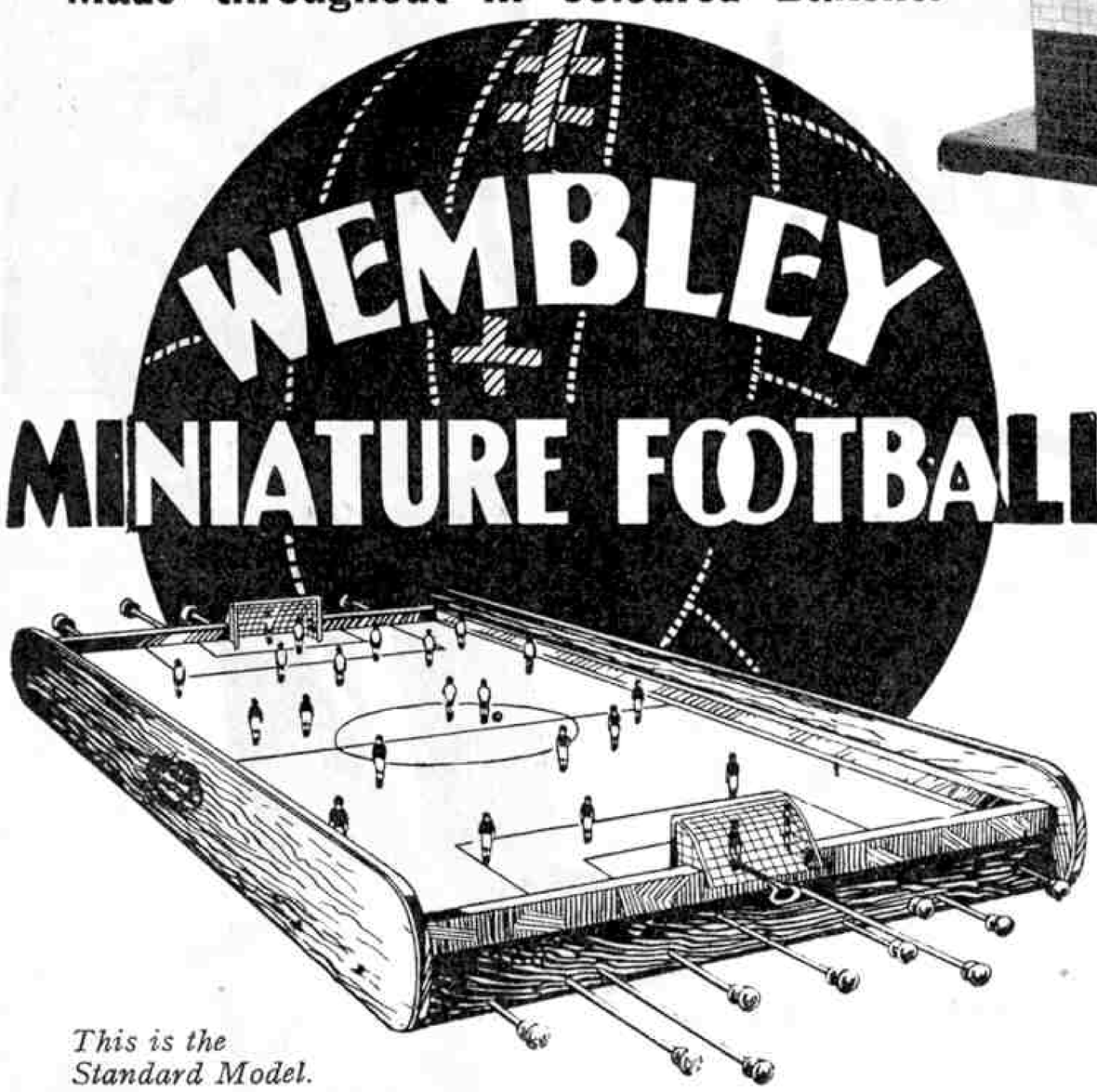

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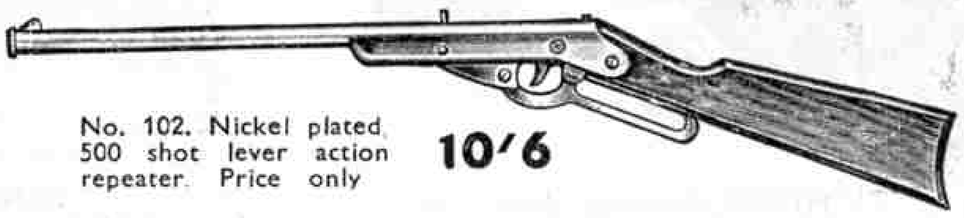

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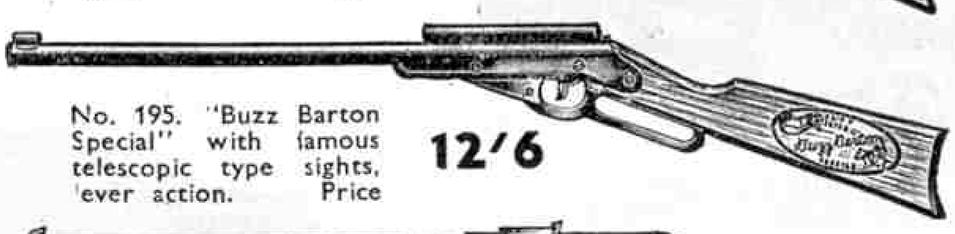

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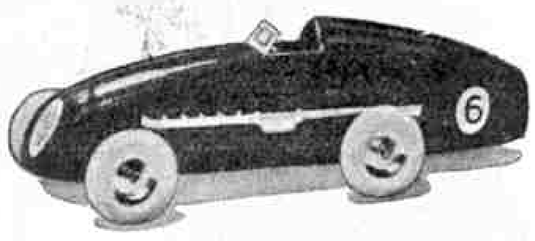

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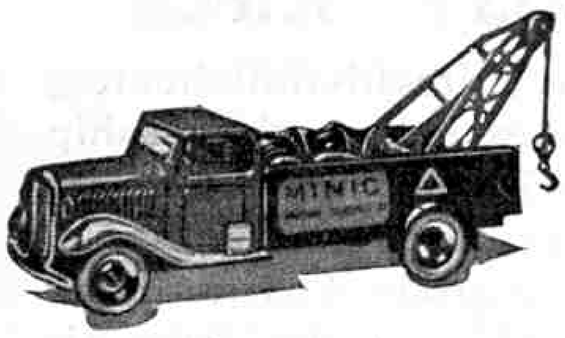

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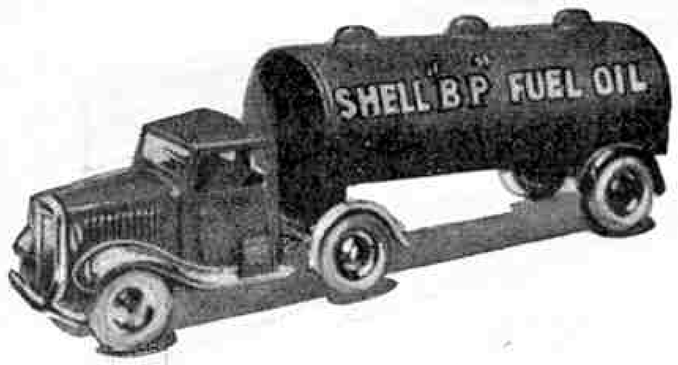

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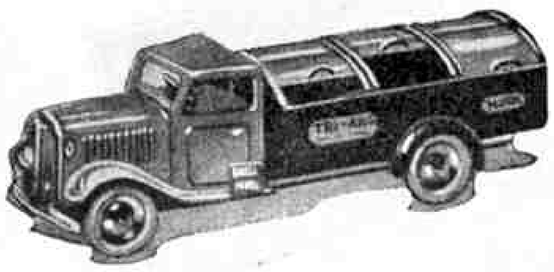

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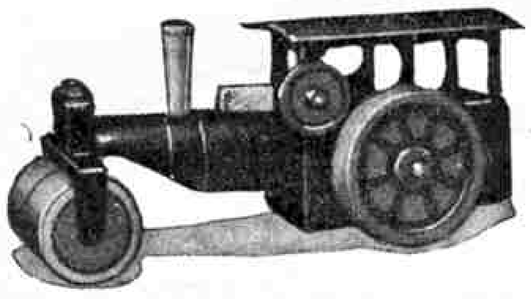

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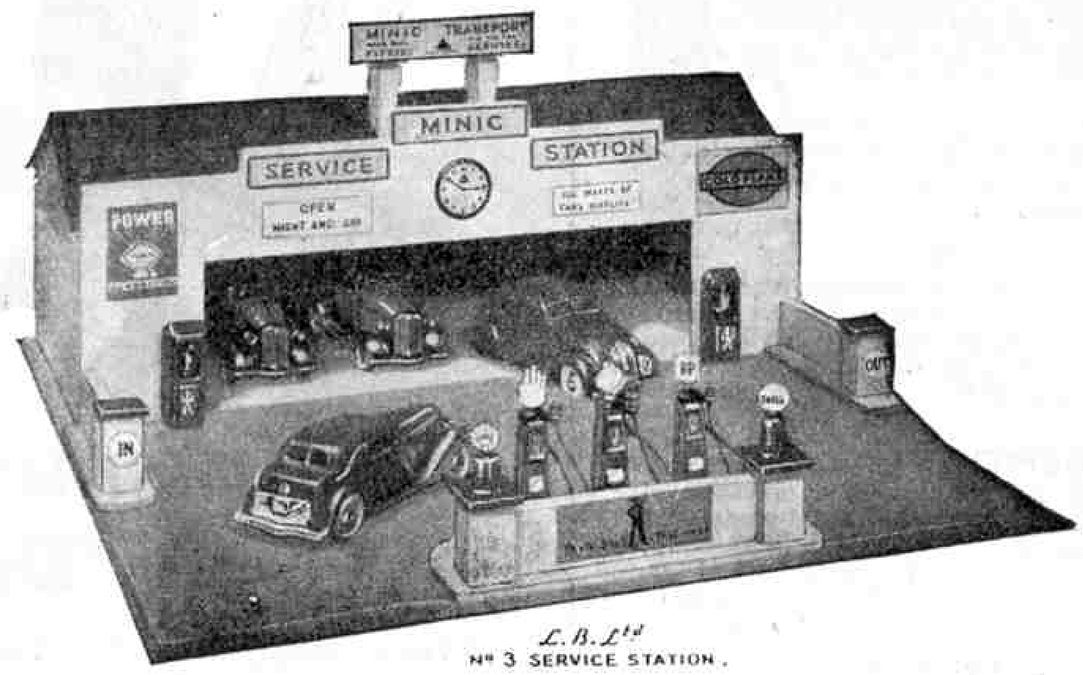

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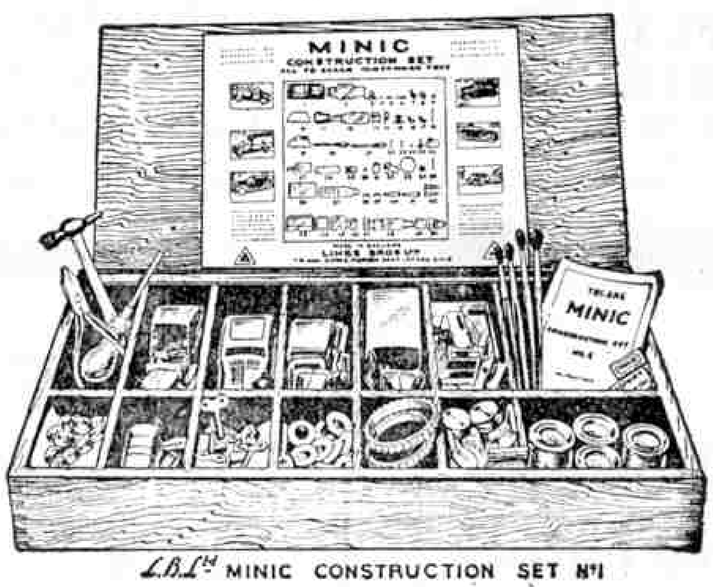
Other models **1/6, 3/11, 5/-, 15/-, 25/-**



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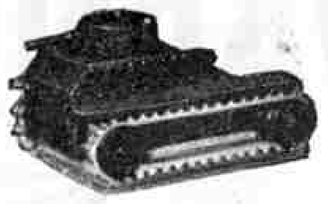

MINIC Light Tank
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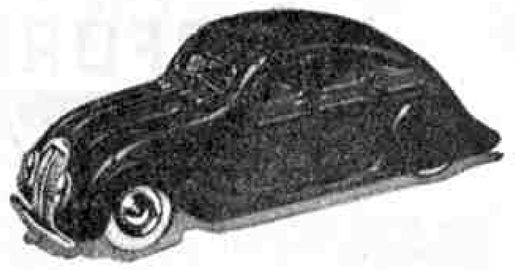
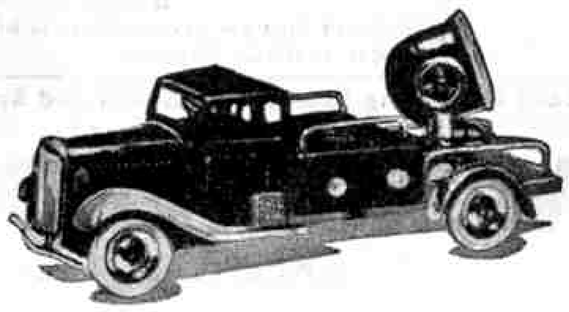
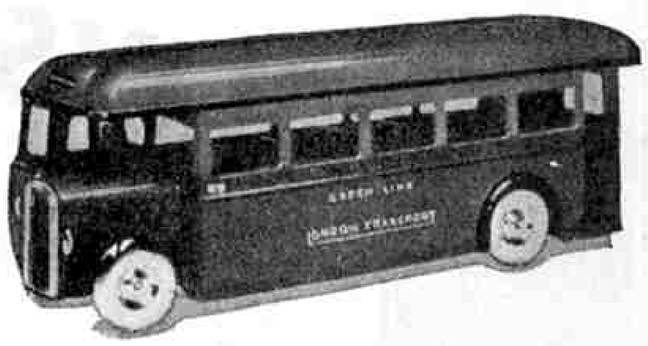


MINIC Streamline Saloon
LENGTH 5 ins. Price **1/-**

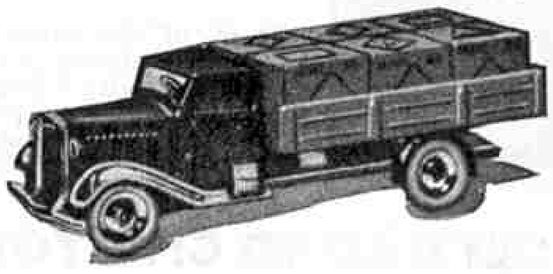
MINIC Petrol Tank Lorry
LENGTH 5⅞ ins. Price **1/-**



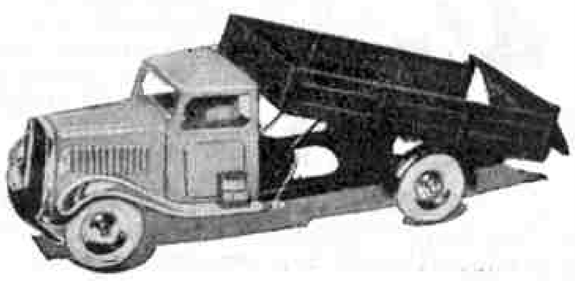
MINIC Searchlight Lorry
with Electric Searchlight and
Battery
LENGTH 5½ ins. Price **3/6**



MINIC Single Deck Bus
LENGTH 7½ ins.
Price **3/6**. Red or green.



MINIC Lorry with cases
LENGTH 5½ ins. Price **1/6**



MINIC Tip Lorry
LENGTH 5½ ins. Price **1/3**

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NEXT MONTH: ON THE FOOTPLATE OF "THE ROYAL SCOT." PUBLISHING DATE: 1st JANUARY

MECCANO MAGAZINE

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Vol. XXI. No. 12
December, 1936

With the Editor

Christmas Greetings

When this issue reaches my readers Christmas will still be some three weeks away, but as the next issue will be dated 1937 I now wish all my readers A Very Merry Christmas. And as the "*M.M.*" is always passed round every household it enters, I extend my good wishes also to fathers and mothers, big brothers, and the uncles who come in so handy at Christmas as providers of good things!

Last December I got into serious trouble. "Spanner," "Tommy Dodd" and the rest of my staff—including "Pawl" the office boy—invaded my sanctum in a state of wrathful indignation and demanded to know why their good wishes also had not been conveyed to readers! This year, therefore, I add their good wishes to mine, and I take the opportunity of saying that no editor ever had more loyal and enthusiastic helpers.

Plans for the Future

All readers will be interested in my plans for the new volume that starts next month. I am not making any big changes because my correspondence shows that the present general plan of the "*M.M.*" is definitely popular. But while thus retaining the main features I have in hand schemes for extensions and improvements that will add greatly to the interest of the Magazine. I will deal in more detail with these schemes next month, but I may mention now that in response to widespread requests I propose to extend very considerably the series of articles under the heading "*How Things Are Made,*" to include a wide variety of products. Other articles will deal with the life story of a famous motor car, a famous motor cycle, a famous bicycle, and so on. A new series of splendidly-illustrated articles on the production of various metals and minerals will be commenced, and the recently-introduced feature "*Something to Think About,*" which has proved even more popular than I anticipated, will be continued.

In short, the "*Meccano Magazine*" next year will be more interesting than ever before.

The Editor
and all his staff wish every reader
a very
Merry Christmas

A Serial Story

Now I come to one feature of outstanding importance. In the past the "*M.M.*" has been entirely without fiction, with the exception of a very occasional short story. Next year I am going to break new ground by commencing a serial story. But this is by no means an ordinary story. It does not deal with school life or wild and sensational adventures; it is the story of a boy's life, from the time when he leaves school to take up an apprenticeship in a large engineering works, to the day when, as a thoroughly-qualified engineer, he becomes a partner in a London firm of consulting engineers. The story is written by a well-known engineer who adopts a pen name for the occasion; and it gives a graphic description of the boy's everyday life as he passes from shop to shop in the works in the course of his engineering training. So far as I am aware no such story has ever been written, and I can assure my readers that they will find it fascinating and packed with really thrilling incidents.

Tributes to Mr. Frank Hornby

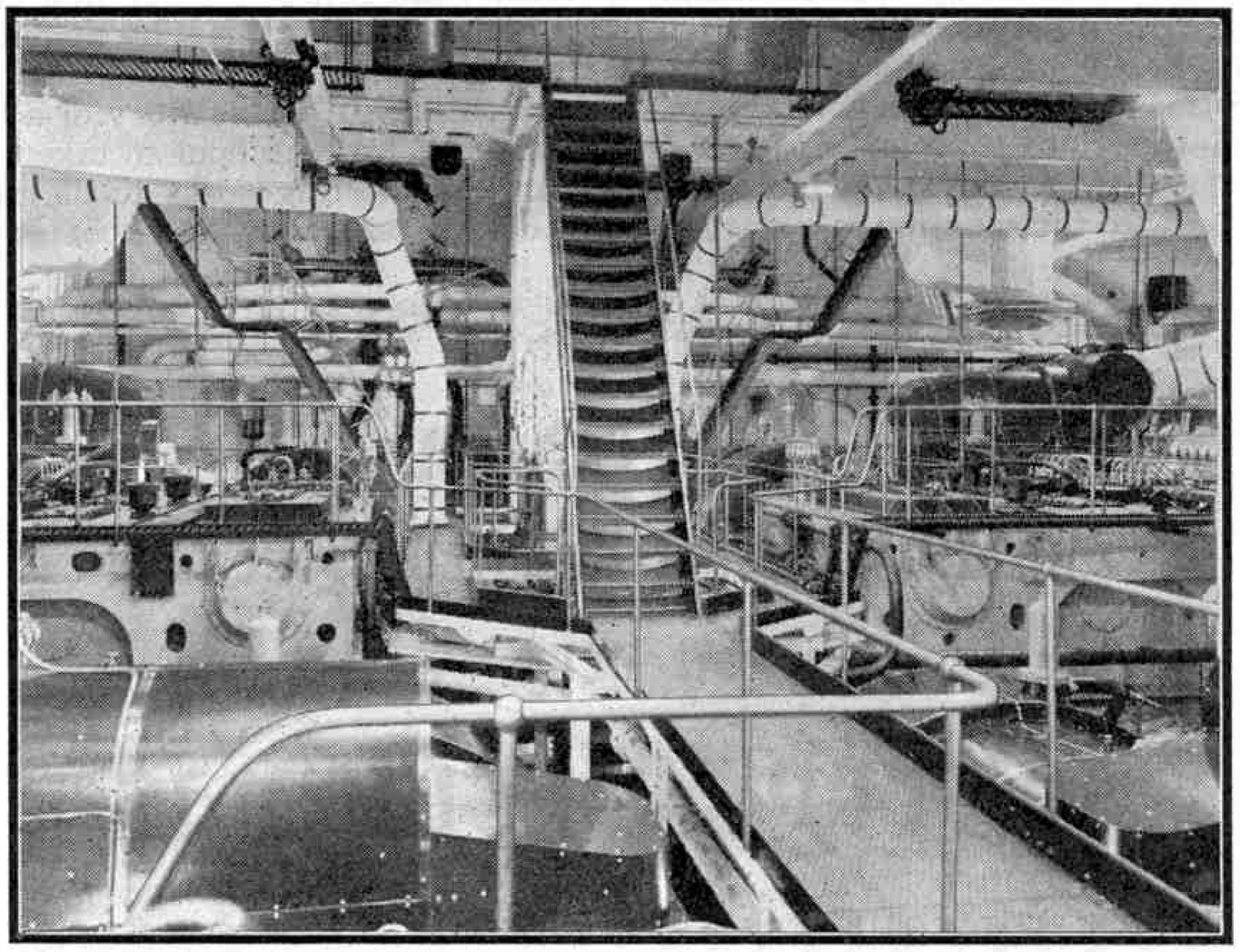
I felt sure that many readers would write to express their regret at the passing of Mr. Frank Hornby, but I was not prepared for the immense number of letters that did in fact reach me. These came from all parts of the world and were written in many different languages. It was particularly interesting to learn that the news of Mr. Hornby's death was announced by radio in Holland, and from a correspondent in that country I have received a copy of a song commemorating his life's work that was broadcast in the programme of the A.V.R.O., or Alg. Vereen. Radio Omroep, from the Hilversum station. This song, composed by Mr. H. Hollander, sketches the merits of Meccano, the foremost of all toys for boys, and expresses the gratitude to its inventor of generations of boys whose lives have been made happier by playing with Meccano outfits, and who owe their success in their careers to the interest thus aroused.

Full Speed Ahead!

Boiler and Engine Rooms of the "*Queen Mary*"

By George Steel

THE "*Queen Mary*" has now won the Blue Riband of the Atlantic and is hailed as the fastest and most wonderful liner in service. Every day news items concerning the great ship's movements are flashed across the world; the decorations and magnificent proportions of her public rooms have been amply described and illustrated; and the swimming pools, squash racket courts, shopping centre, children's playgrounds and other marvels of this floating city have all received their fair share of attention. Of all the myriad features that go to make up this wonder vessel, however, the most important have been seen by few of her passengers. These are the boiler and engine rooms, where the men on whom every knot depends work unceasingly. The engineers and firemen must perform their tasks efficiently before the propellers of the giant liner can turn half a revolution, or her huge rudder can move through a single degree. They also hold the key to practically every necessity and luxury of life on board; and a cook cannot even switch on an electric stove unless they have first supplied the necessary power.



Looking aft in the after engine room of the "Queen Mary." We are indebted to the courtesy of John Brown and Company Limited, for the illustrations to this article.

Unremitting watchfulness throughout every minute of the 24 hours of every day is absolutely essential to the smooth and safe running of the "*Queen Mary*," and the responsibility of the Chief Engineer and his staff is truly colossal. Engineer officers in charge never leave their posts when the engines are running, and at sea they are on duty for four hours, with eight hours off duty, all round the clock. If an engineer is allotted the four hours from eight p.m. to midnight he will also be on duty from eight a.m. to 12 o'clock midday during the daytime. In port the Chief Engineer arranges hours and duties for his engineer officers as may be necessary or convenient, and the regular sea watches of "four on and eight off" are not maintained.

When on duty every engineer officer and electrician has a thousand and one tasks to carry out. To begin with the four propellers are driven by four sets of turbines, each set consisting of four turbines coupled to a huge totally enclosed gear wheel. These turbines require a host of smaller auxiliary machines to enable them to run, and the temporary failure of any one of these could lead to, if not a serious breakdown, at least a very appreciable drop in speed. To prevent this, almost all of these auxiliaries are duplicated, and in an emergency a standby set would be immediately brought into use.

The forced lubrication system, which is of such paramount importance, requires a total of 12 powerful pumps, three to each set of turbines, and each capable of delivering 36,000 gallons of oil per hour. To the average motorist who thinks of lubricating oil in pints and quarts, or perhaps occasionally buys a five-gallon drum, this will give some idea of the enormous quantities required to operate these modern symbols of marine power and speed. In addition, the motorist need not worry overmuch about the cooling of his lubricating oil. The "*Queen Mary*" requires two oil-coolers for each set of turbines, however, and a centrifugal pump with a capacity of 1,850 gallons per minute supplies cooling water to each pair.

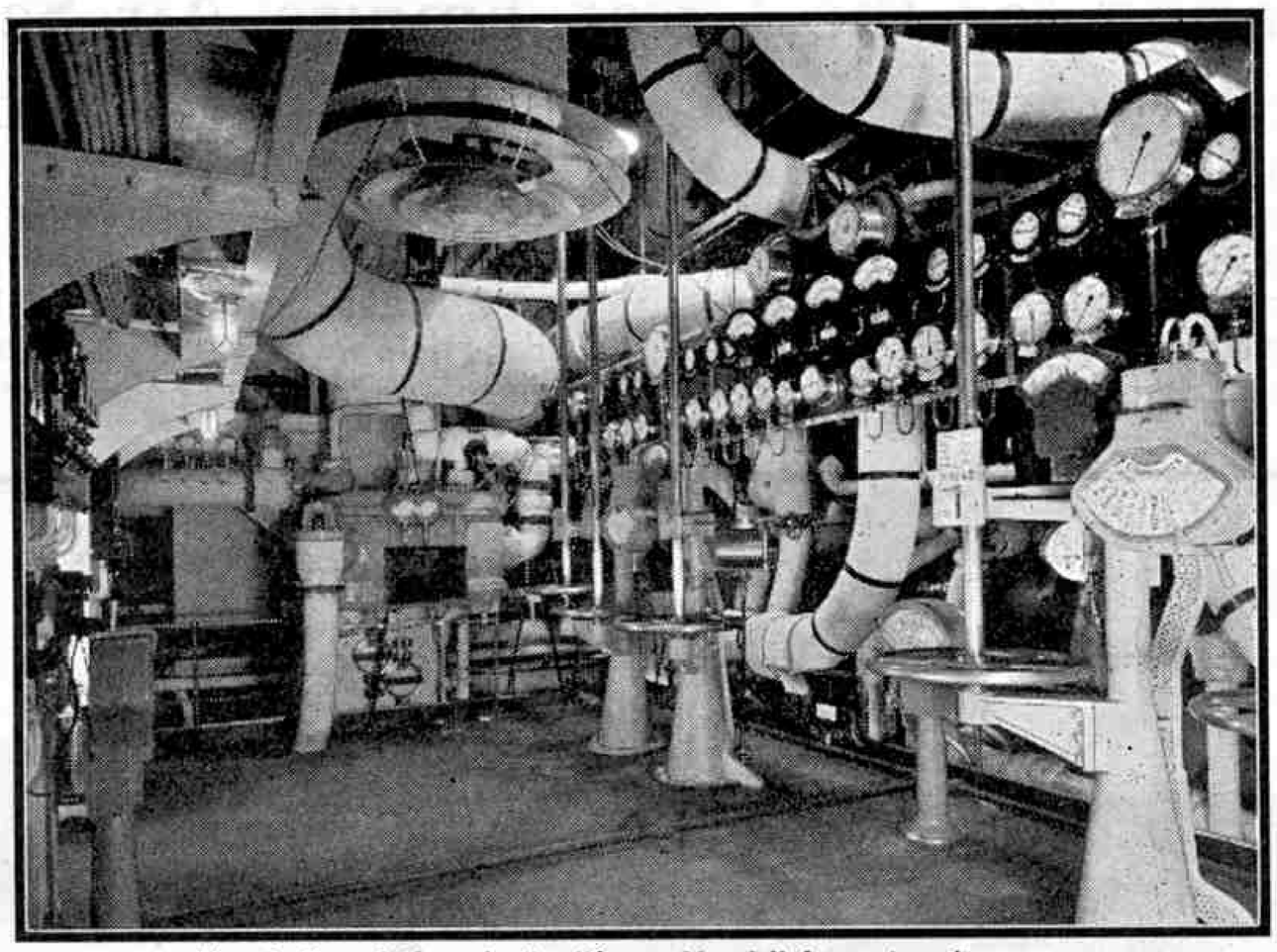
Four sets of strainers are installed between the forced lubrication pumps and the oil-coolers to trap and collect every particle of dirt and sediment. Turning a handle is all that is necessary to completely remove any accumulation of foreign matter in the lubricating oil, and this can be done without shutting off the supply for a moment. All the turbine bearings, thrust blocks, gear case pinions and other moving parts must be supplied with a continuous flow of cool oil under high pressure, and many of the delivery pipes are so arranged that the valves can be padlocked in the open position, to prevent any possibility of stoppage of the oil supply to vital parts. In addition, every bearing is fitted with a temperature gauge, and readings are constantly being taken and checked.

The "*Queen Mary's*" engine room is literally a forest of gauges. Hundreds of tell-tale dials are visible everywhere, telling at a glance their vital stories of pressure or temperature. Some work only a foot or so from their bases; others are arranged for remote reading, so that the engineers on watch at the control stations, maybe 100 ft. or so away, are constantly in touch with conditions in the engine and boiler-rooms at any moment throughout the 24 hours.

The control stations themselves present a bewildering

yet most imposing array of shining wheels, levers, valves, clusters of gauges and indicators of various types. Prominent among them are the huge hand-wheels, nearly a yard in diameter, which control the admission of steam to the high-pressure turbines. Secondary sets of wheels admit steam to the astern turbines. The astern master valve cannot be opened until the ahead valve is closed, but astern steam is frequently admitted while the turbines may be still moving ahead.

The electric telegraphs, which transmit orders from the bridge, are in positions in which they can easily be seen. Each is fitted with a metallic-sounding gong, and is arranged for instantly repeating the order. Blackboards arranged in convenient positions are used for chalking up each variation and the condition of a multitude of matters, so that each engineer coming on watch can tell at a glance just how things stand, without having to enquire or investigate for himself. A desk is provided in the centre of the control station where particulars of every order from the bridge, with the time and date it was given and other important details, are entered in the engine-room log, in which it is possible to trace the complete history of every voyage at the end of each trip.



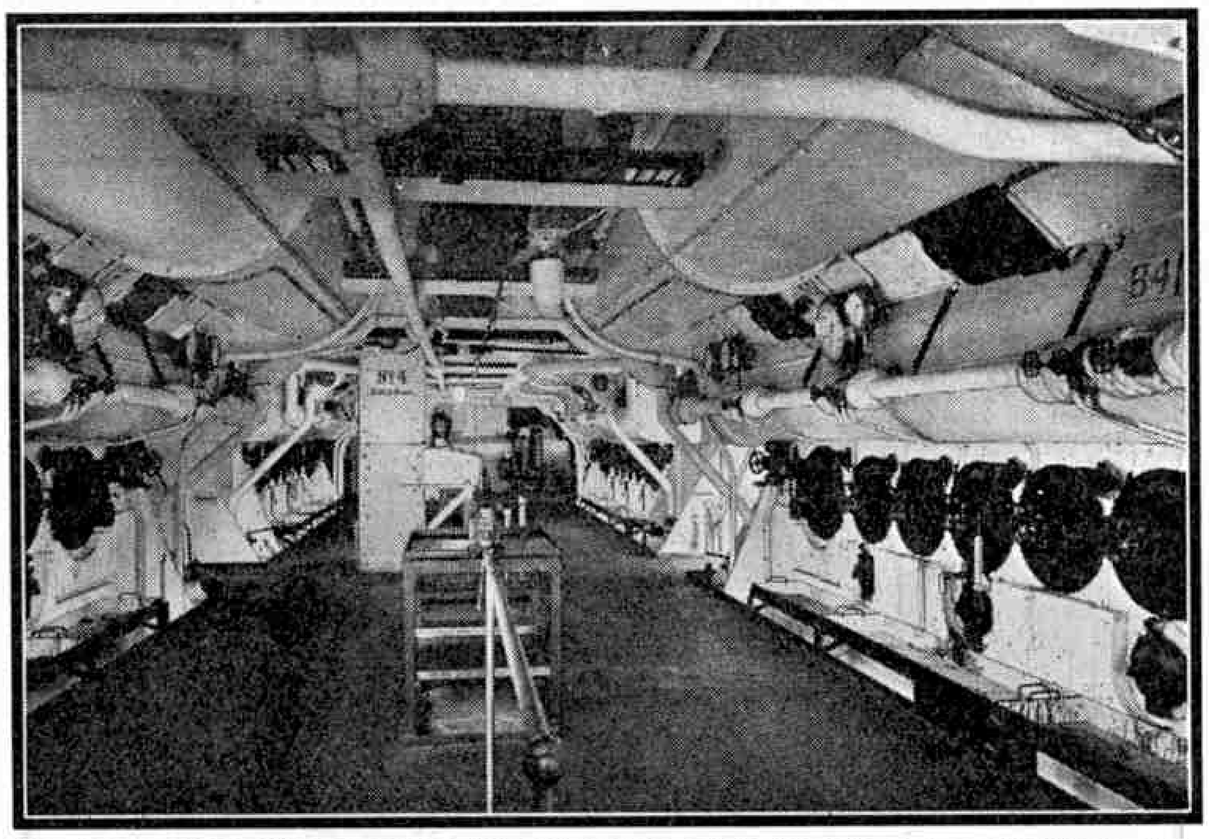
The starting platform in the "Queen Mary's" forward engine room.

Standing at the control stations, one is struck with a most uncanny sense of enormous power that seems to vibrate through the very air. Pent-up energy is evident on every side. Power, relentless and terrible, yet absolutely controlled, seems to be the keynote of the *"Queen Mary's"* engine-room. The turbines themselves, their steel covers gleaming dully under the bright lights, seem to be brooding, fretful and watchful, waiting for the touch of human hands to unleash their vast power. White-jacketed steam pipes, some of them thicker than a man's body and others the thickness of one's arm, tell of high-pressure steam. Miles and miles of piping and wiring lead everywhere, the copper pipes shining like gold. All curve and turn out of sight, each one performing its predetermined task, carrying oil, water, steam or electric current to a thousand different places.

Even when the main engines are silent, the regular beat of a pump, or the distant muffled hum of the turbo-generators still give one that sense of being in the presence of dormant power, all the more insistent because of the bright lighting and white enamelled steel walls. Brilliant lighting indeed is a feature of the engine-rooms, and there it is hard to realise that one is deep down in the bowels of a ship, well below the water line. There are no dark corners, and every part of the machinery is as visible as if it were in a well-designed modern factory with glass roofing.

This applies also to the boiler-rooms. There are 24 main boilers, all with white painted steel fronts. The steam pipes too are covered with a pure white insulating material to retain heat, and the general effect is one of extreme lightness and airiness. Double-inlet fans to the number of 32 supply air for forced draught. The actual apparatus that sprays the oil fuel under pressure into the furnaces consists of 12 oil-burning units, each comprising an electric rotary pump, duplex suction strainers, discharge strainers, and a heater the purpose of which is to warm up the heavy fuel oil in order to make it thinner and more easily sprayed on to the flames. Four displacement pumps of 100 tons per hour capacity are fitted for transferring the oil fuel from the huge storage tanks to the settling tanks, and oily ballast strainers free bilge and tank water from oil before it is pumped overboard.

The foremost boiler-room is quite separate from those containing the main boilers. It houses three cylindrical boilers supplying superheated steam for the hotel generators, and saturated or ordinary steam for the various ship services. Two air compressors supply 300 cu. ft. of compressed air per minute, while four fans are constantly at work delivering 200,000 cu. ft. of ventilating air per minute to each engine-room. Seven turbo-generators, each with its own condensing and forced lubrication equipment, supply the *"Queen Mary's"* 578 electric motors, which have a total of about 17,818 h.p. They range from the smallest circulating pump motors of $\frac{1}{2}$ h.p. to the 292 h.p. motors operating the anchor and warping gear.



The boilers of the "Queen Mary" have white painted steel fronts and, as our illustration shows, the boiler rooms are light and airy.

It is essential in a marine steam turbine installation to condense the immense volume of exhaust steam and return it to the boilers in the form of hot water. The *"Queen Mary's"* four main condensers are cooled by sea water circulated through them by eight powerful pumps, each capable of dealing with 25,000 gallons per minute. Water extraction pumps then pass the condensed steam through coolers on its way to the feed pump suction.

New Flying Boats for Imperial Airways

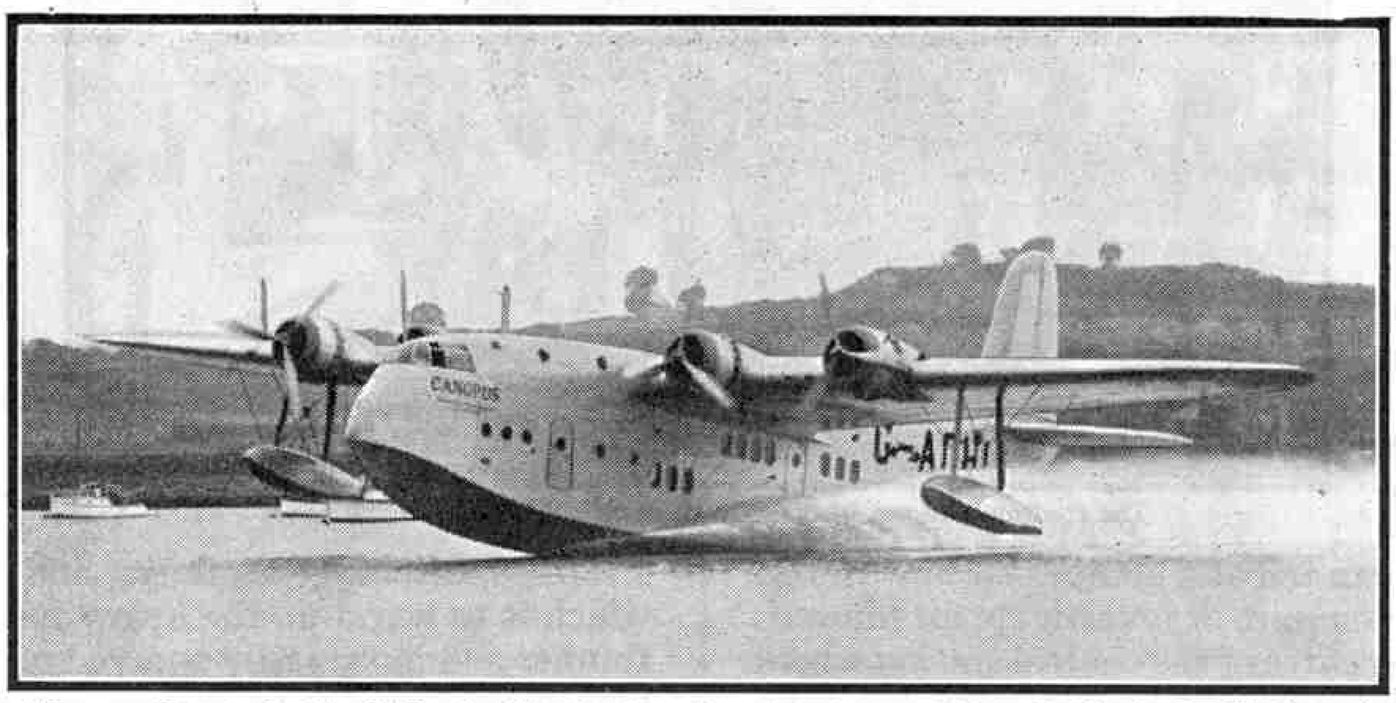
Preparing for the Great Empire Air Scheme

NEXT year promises to be one of the most important in the history of British commercial aviation. Preliminary flights over the North Atlantic route will be carried out, in preparation for a regular service that will connect this country with the air mail systems of Canada and the United States. In addition the great Empire air scheme by which mails in bulk are to be borne from England along the main Empire routes without any extra fee, will come into operation.

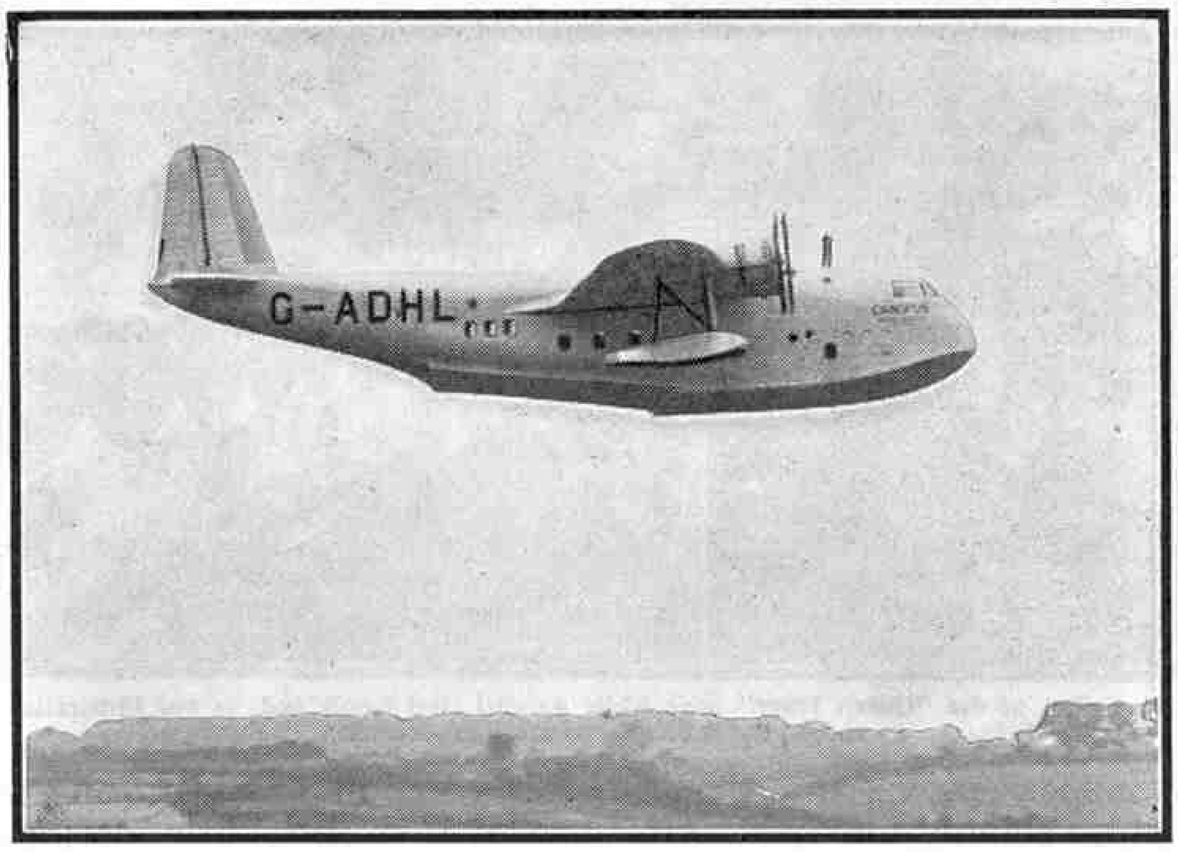
Under this scheme passengers will be able to travel to South Africa or Australia without change of aircraft. This will be an immense improvement, as at present air travellers to either of those distant termini have to journey from Paris to Brindisi, on the Mediterranean coast of France, by train, and subsequently have to transfer at several points to aircraft more suitable for the ensuing section of the route. At present the air services along the Empire air routes operate only during the day, and the passengers have to sleep overnight in hotels, or in rest houses established by the company, at the stopping places chosen as the termini of each day's journey. The night flying to be introduced under the new scheme will dispense with this great inconvenience, for the aircraft employed will be equipped with sleeping accommodation.

By flying during the night as well as in the day, it will be possible to cover much greater distances at economical speeds than under the present arrangements. It now takes 6½ days to reach Calcutta by air, for instance, but under the new scheme the time will be reduced to four days. A flight from London to Singapore under present schedules takes 8½ days, but it then will be possible in 5½ days. Going further, the air journey from Croydon to Sydney, Australia, will be done in only eight days instead of the 12½ now required. These striking reductions do not represent the ultimate improvement that will be achieved, for schedules will continue to be speeded up progressively as improvements are effected in ground organisation, eventually shortening the flying time by another 1 or 1½ days.

It is for this new scheme that Imperial Airways have under construction a fleet of 28 flying boats and 12 landplanes. In this article we are concerned only with the flying boats, as none of the huge monoplanes, which were referred to briefly in the January 1936 "*Air News*" pages, is yet completed. The flying boats are being produced by the well-known firm of Short Brothers (Rochester and Bedford) Ltd., the builders of the flying boats "*Scipio*" and "*Satyrus*" employed for several years past on the Mediterranean section of the Empire air routes. Up to the present three of the new aircraft, named "*Canopus*," "*Caledonia*" and "*Centaurus*" respectively, have left the stocks. "*Canopus*" completed its test flights in September, and afterward received the luxurious internal equipment. The boat began its career last month, when it was put into service on the Mediterranean section already mentioned. "*Caledonia*," now undergoing test flights, has been selected for experimental long-distance flights that have been planned with a view to obtaining data for actual Atlantic flights. As a preliminary to this important research work it will probably undertake a 2,500-miles flight around the coast of Britain early next year. "*Centaurus*" has also gone into service in the Mediterranean.



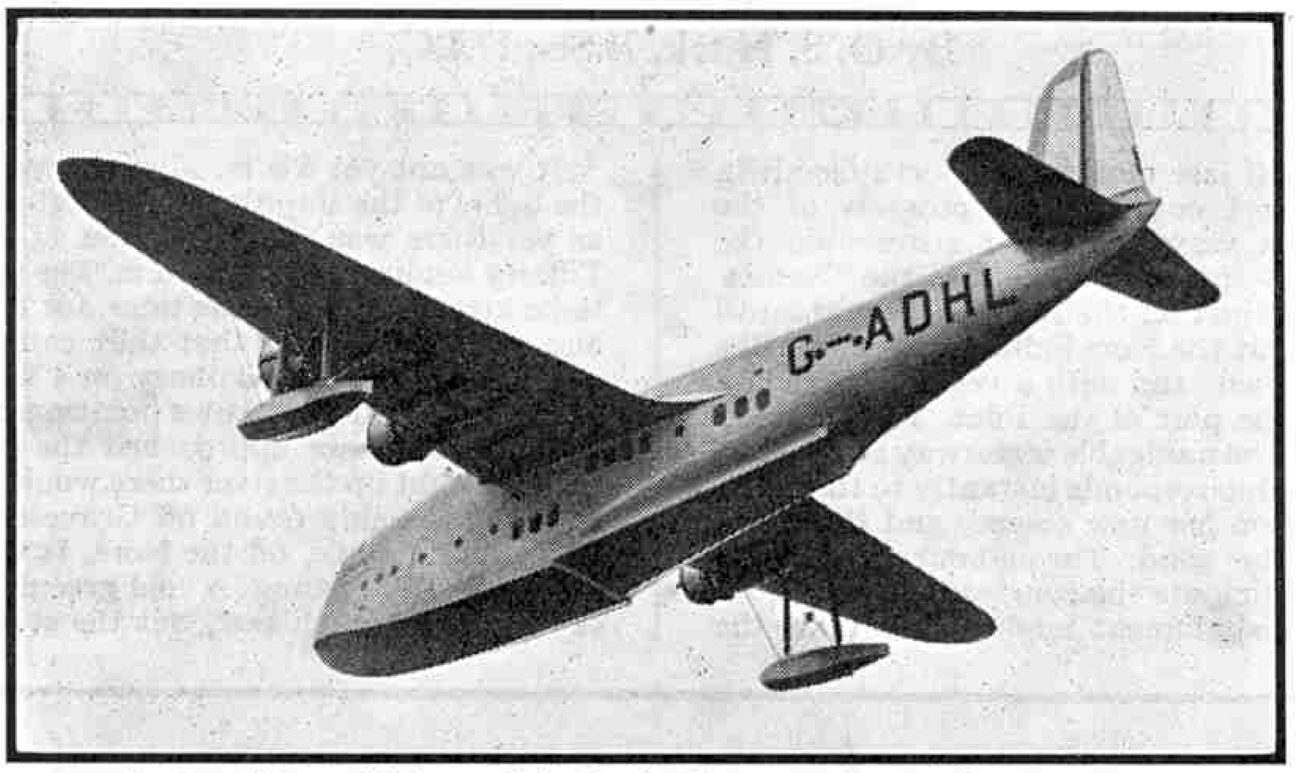
"Canopus," the first of the 28 Empire flying boats for Imperial Airways, taking off at Rochester. Photographs on this page and the upper one on the opposite page by courtesy of "Flight."



This broadside view of the new flying boat shows the deep two-deck hull to advantage.

The exterior views of "*Canopus*" on these pages convey a good idea of the great size of this and the other new Empire flying boats. It is 88 ft. 6 in. in length and is 24 ft. in height from the waterline to the top of the hull, and the wing span is 114 ft. These dimensions show that the machine is slightly larger than the Short "*Scipio*" already mentioned. "*Canopus*" is a high wing monoplane of the cantilever type, that is, the projecting wings are not additionally supported near their tips by any external bracing, and it is of all-metal construction. Structurally the

machine differs in many respects from previous Short practice. The "backbone" of each wing is a low "box" spar of almost rectangular cross-section, and the leading and trailing edge portions of the wing are attached to this spar. Landing flaps are fitted along part of the trailing edge of each wing. The petrol tanks are placed inside the wings, and are thus well clear of the passenger quarters in the hull. This isolated and lofty situation minimises the danger of the machine catching fire if ever a forced landing had to be made upon land. A large metal float is suspended in a fixed position beneath each wing and near its tip, by three pairs of struts.

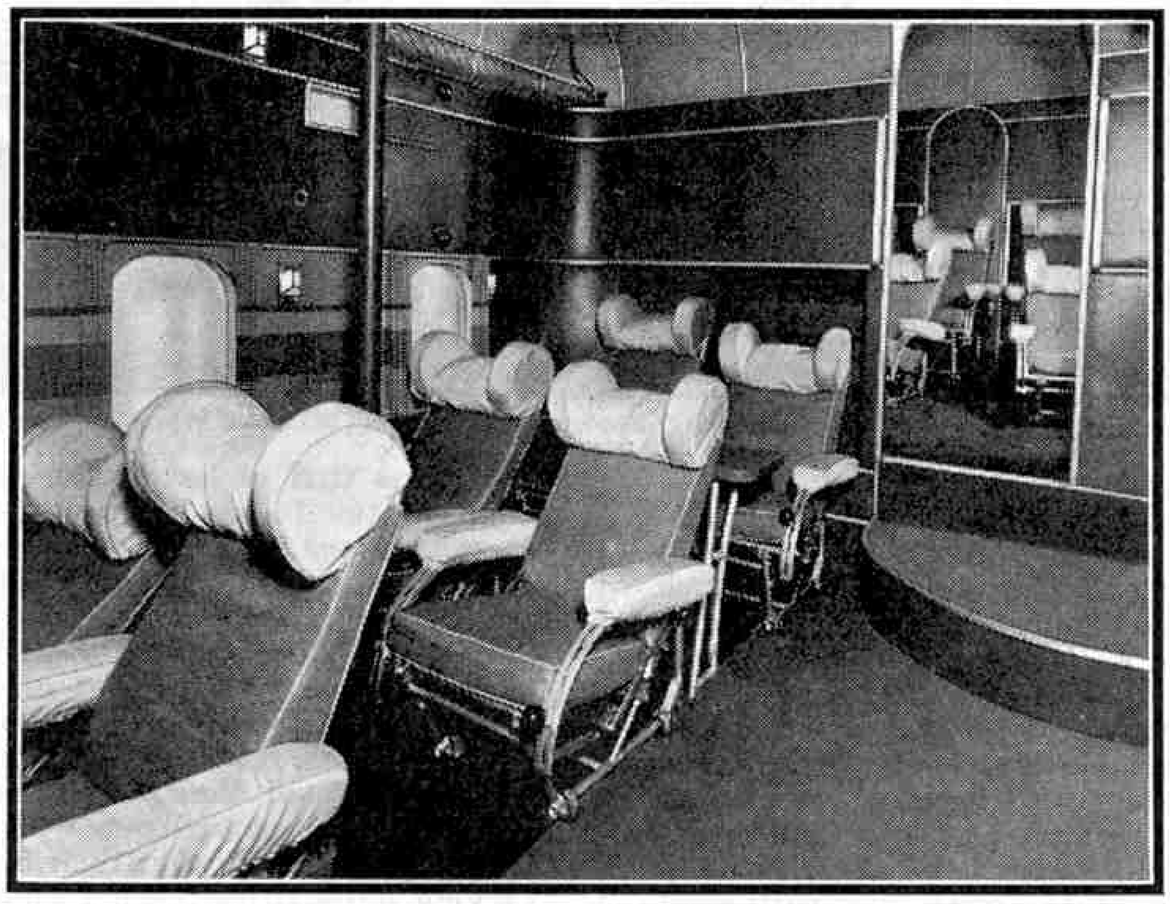


Another picture of "Canopus" in the air. The great wing span is very evident.

The framework of the massive hull consists of a long series of vertical straight-sided "rings" spaced only a short distance apart and connected by about 50 continuous horizontal stringers. This framework, like that of the wings, is covered externally by metal sheeting. There are two decks in the hull. The foremost compartment of the upper deck is, of course, the cockpit, or "control room" as it is called, with side-by-side seating for the Captain and the First Officer. The curved front wall of the cockpit consists chiefly of a large and almost hemispherical window that provides an exceptionally fine and unobstructed view in all directions except directly behind and straight down. When the flying boat is upon the water, the pilots can observe the surface of the latter up to 15 ft. from the bows, without craning forward. The cockpit is provided with the most modern types of navigational instruments, and includes an automatic pilot and "blind flying" equipment.

Immediately behind the cockpit is the wireless operator's cabin, and to the rear of this is a long mail compartment in which about three tons of mail can be stowed. Arrangements have been made for dealing with mail while the boat is in flight, and the ship's clerk has an office in this compartment. The upper deck is continued behind the junction of the wings with the hull, and the rear portion consists of a roomy hold in which the bedding is stored, and a baggage hold to which access is obtained from below through a hatch in the floor. This completes the accommodation on the upper deck.

Inside the blunt nose of *"Canopus"* is a compartment where the mooring ropes and other relative equipment are stored. A gangway at one end of the room leads to the cockpit almost overhead. The second compartment on the lower deck is the Smoking Cabin, which has accommodation for seven passengers during the day and four at night. A little farther back, and separated from the Smoking Cabin by the passageway from the main entrance of the flying boat, is the kitchen, and adjoining it is a gangway leading to the mail compartment and clerk's office on the upper deck. The Midship Cabin is the smallest of the four passenger cabins, and accommodates only three people during the day. When converted into a sleeper at night, however, there is provision for four people, as in the case of the other cabins. It is followed by the largest, or Promenade Cabin, and the After Cabin, which seat eight and six people respectively. The flying boat thus has seating for 24 passengers during the day, and sleeping accommodation for 16 at night. The remaining available space in the stern of the hull is used as a mail, freight and baggage hold.


View of part of the Promenade Cabin, with the After Cabin in the background. Photograph by courtesy of Imperial Airways Ltd.

The interior decoration and fittings of the passenger quarters of the *"Canopus"* make this flying boat the most luxurious air liner in the world. Great care has also been taken in designing the passenger cabins to ensure that they shall be as quiet as possible, and the noise of the powerful aero engines reaches them only as a very low hum. A special heating and ventilating plant enables an ideal temperature to be maintained, and the air to be changed frequently.

"Canopus" has four Bristol "Pegasus X" engines, and these are fitted two on each side of the hull in streamlined cowlings that project from the leading edge of the wings. These cowlings have controllable flaps so that the amount of air admitted for cooling the engines can be varied as required. The "Pegasus X" is a 9-cylinder air-cooled and supercharged engine of the radial type, and is so compact that it is only 4 ft. 6 in. in diameter. It can develop 960 h.p., with a total weight of little more than 1 lb. per horsepower. Each engine has nearly 166½ sq. ft. of cooling area, and during a 13½-hours' flight this will dissipate 260 b.h.p. in heat energy, or sufficient to drive an express locomotive from London to Carlisle. Over 70 different kinds of materials are used in building a "Pegasus" engine, and during production the majority of the components are submitted to about 20 different inspections and tests.

The total of 150 "Pegasus" aero engines being produced by the Bristol Aeroplane and Motor Co. Ltd., for the fleet of Empire flying boats, comprises the largest order of its kind ever placed for British air line equipment.

The high standard of comfort and efficiency attained in the *"Canopus"* will be repeated in the other boats.

Homeward Bound

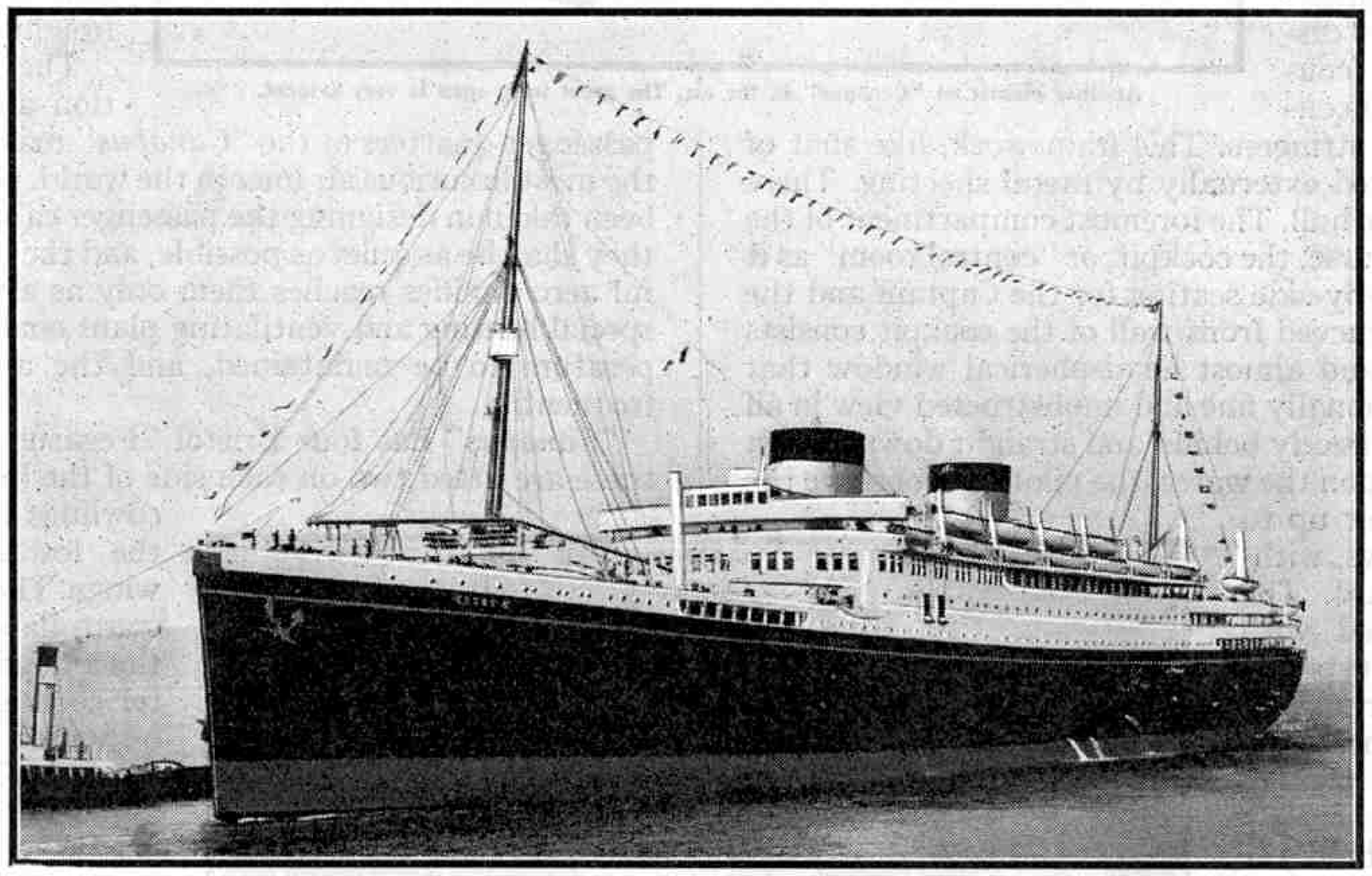
Up the Thames on a Cunard White Star Liner

(concluded)

By O. S. Nock, B.Sc., D.I.C.

AT the point where I broke off last month the North Goodwin Light was abeam, and now I come to the progress of the "*Georgic*" up the Thames. This vessel, and her sister ship the "*Britannic*," are the largest ships that ever come into the Thames. From the Elbow buoy, which lies just off the North Foreland, until the mouth of the river is reached at the Nore lightship, it is just like threading one's way through a maze, and with a vessel of such size consummate skill is needed on the part of the Pilot. The channels are not merely shallow, in places the navigable waterway is less than 50 yards wide. Then, although a ship responds instantly to the helm, some time elapses before she is on her new course, and that time depends on the currents and the wind. Throughout this highly intricate stage the Pilot must anticipate the courses that will be required, for even the smallest misjudgment might easily run the ship aground.

For me it was a wonderfully fascinating experience. Earlier in the evening, when one of the officers was explaining the estuary, I had made a rough sketch map showing the channels and the whereabouts of sand banks, and now it added greatly to the enjoyment of the trip to be able to pick out the various lights. Their very names add a rare touch of distinction—South Edinburgh buoy; Knock John; the Knob Bell; Shivering Sand. The conditions were very favourable, for on a clear and brilliant night such as this the buoys can be picked out more easily than in broad daylight.



The Cunard White Star motor liner "Georgic." Photograph by courtesy of Cunard White Star Limited.

After passing the Elbow we turned a little to the north-west and headed for the Tongue lightship. I noticed that Mr. Anderson was giving all the courses in degrees rather than by compass points such as "North-west by north ¾ north"; the Thames estuary requires very fine adjustments of the helm, and his voice came "Three-five-five," then "Three-five-oh," and so on as we veered round. The sea was now fairly alight with flashing buoys. On our port bow there lay the Shingles, a group of pebble ridges where seals play at low tide, and our course lay just to the north-east of them through the South Edinburgh channel. It is the sharp turn round the N.E. Shingles buoy that is the trickiest piece of all, for here the ship has to be pulled round through an angle of about 45 degrees in a very short distance. The Shingles lie almost in a direct line between Margate and Clacton-on-Sea, and almost due east of Shoeburyness.

This entry to the London river, and the approach to Southampton, are a very striking contrast to the conditions on the other side of the Atlantic. At one time the approach to New York was by just such another winding course, but, with the characteristic American boldness that has produced skyscrapers and other marvellous feats of engineering, a deep waterway was blasted out of the solid rock, and now the biggest ships can sail straight into port up the famous Ambrose channel. West of the Shingles our course became more direct. We were steaming now in a south-westerly direction down the Knob channel and then, passing through the Oaze Deep, we gradually veered round on to a course almost due west, and at last were heading straight for the mouth of the river.

It was not yet 5 a.m. Mist was coming with approaching dawn; the lights of the ship threw a soft ghostly sheen on to the water, and as yet there was not a glimmer of daylight. We were not due at Tilbury landing stage till 9 a.m. The arrival times of these ships have to be arranged to suit the tides, for it is only during the hour before and after high water that they can be got into dock. As a consequence they berth at Tilbury on a flowing tide, and of course must be moored with their bows pointing downstream. It was just about slack water as we approached the Nore lightship, and if we had gone straight up the river there would not have been sufficient depth to swing the ship round off Gravesend. So the Captain decided to anchor for a while, off the Nore. It was just 5.30 a.m. and daylight was gradually coming. A cold greenish light was spreading over the sky from the north-east, but the stars still twinkled overhead and the mast lights shone brightly. The telegraph bell rang sharply; then the voice of one of the officers speaking down to the engine-room—"The ship is at anchor. We shall be getting under way again at 7.15 a.m." I went below to my cabin and snatched an hour's sleep.

* * *

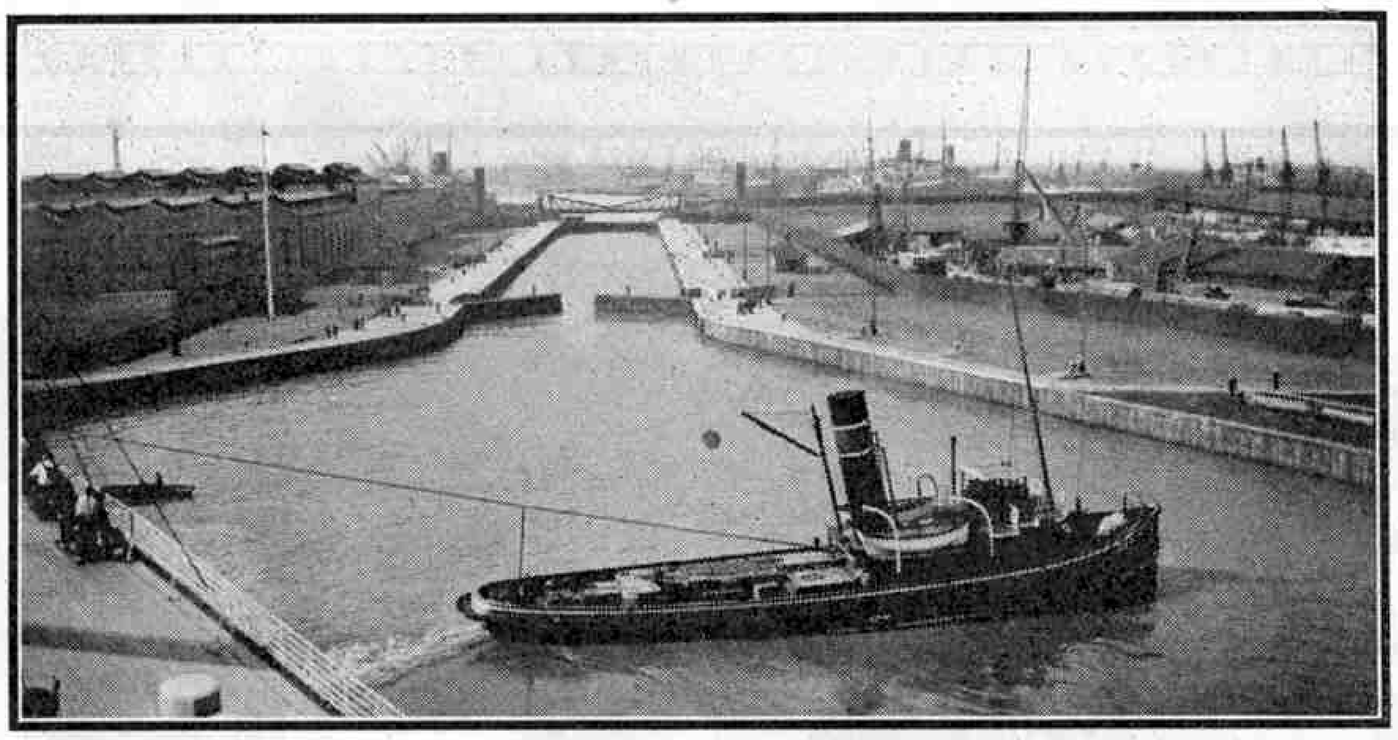
At 7 o'clock the sun was up, and the whole estuary was bathed in a soft rosy light. On our port bow not half a mile away was the Nore lightship, but beyond that there was nothing to be seen, for the mist reduced visibility to less than a mile. There was hardly a breath of wind, and the only sound was that of heavy grating as the windlass hauled up the anchor chain. It was a little after 7.15 when we were under way. We might have been in the open sea, yet Southend was barely three miles away to the north, and right opposite, somewhere in the mist, lay Sheerness at the mouth of the Medway.

From the Nore there is a dredged channel that leads into Sea Reach but the buoys are as much as a mile apart and we were literally feeling our way up this morning, for in the grey light that followed sunrise it was most difficult to sight the buoys. Here too we first encountered the Thames barges. These broad, blunt-nosed craft are most picturesque with their rich brown sails, and are usually so well laden that their hulls are only just above the water. Tacking across to catch what wind there is, they slip out of the mist and plough their way right across the dredged channel. At last some land was discernible, the flat marshes of Canvey Island just to the west of Southend. Near the river bank the land was a rather wan greenish-yellow in the filtered sunlight, and inland it quickly faded into the mist. The water was a foaming muddy green. But by the time we passed Thames Haven, and the Cliffe marshes stretched far along the south bank, the sun was getting some power. The river could be seen ahead curving round in the first of its sharp bends, and the hills lying to the south of Gravesend were looking very beautiful in the haze of distance.

There is almost a right-angled turn to the south when entering The Lower Hope, as this next reach is called, and all the time the river is getting narrower. We could see Gravesend now, some four miles away across the marshes, and the river making another

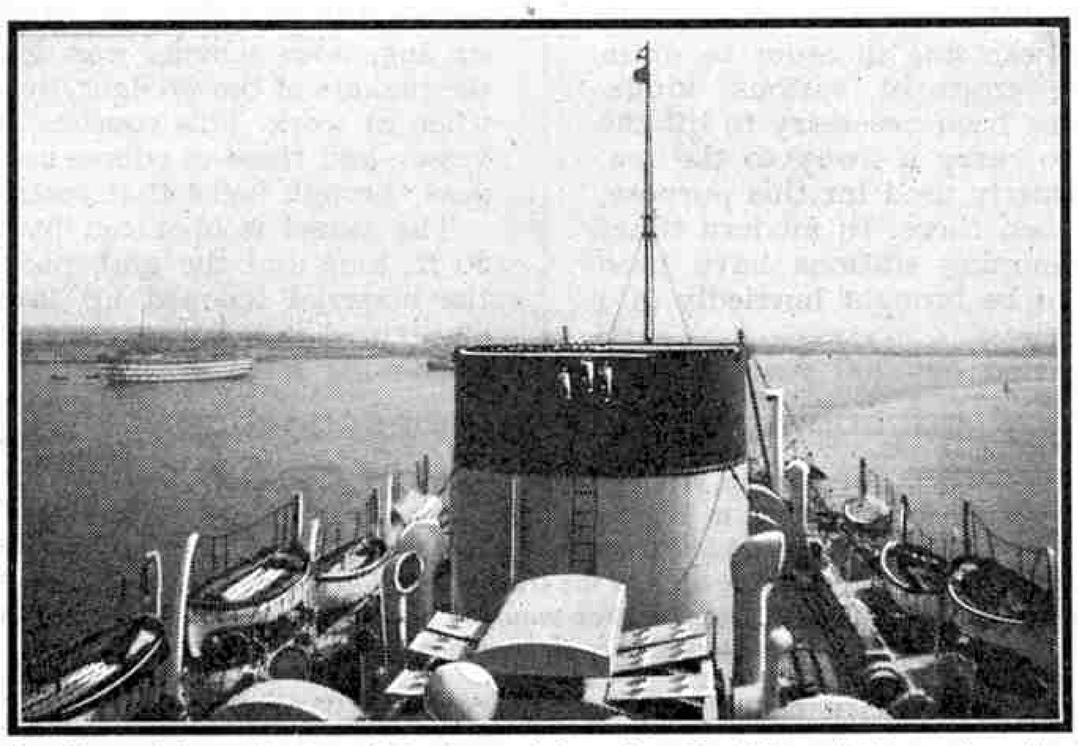
meandering curve in order to get there. The yellow funnels of Orient liners lying in Tilbury docks gleamed in the sunshine, and as we turned into Gravesend Reach the river was alive with shipping. Several merchantmen were lying up on the south side, there was a beautiful schooner, an old man o' war now used as a training ship, and more sailing barges picking their way amongst all.

Now the pilot cutter was putting out to meet us, and three tugs with full steam up were manœuvring into position. The River Pilot's job is done on arrival off Gravesend, and his place is taken by a Mud Pilot for the final stage up to the London docks. Mr. Anderson remained on the bridge till the very last minute; then, with the *"Georgic"* practically at a standstill, and the cutter alongside, it seemed only a matter of seconds after he had gone before the Mud Pilot was up aloft and had taken over. One look over the port wing of the bridge, and he had summed up the whole position. In a trice his directions were following each other like lightning—"Half back, Port; full ahead Starboard."—"Stop Port"—"Half ahead Starboard"—"Hard a'Port"—"Full ahead Starboard" . . . With two tugs at the bow and one at the stern the ship was being slowly swung round in the river, and all the time the Pilot's orders and the acknowledging rings on the telegraph came with never flagging rapidity. The helm had now been taken by the Dock Pilot, who also had come on board at Gravesend. So, at a little after 9 o'clock, we were alongside Tilbury landing stage.



The "Georgic" about to enter the lock leading to King George V Dock, London. The entrance gates are just opening as the tug pulls the bows of the liner round.

But although business was quickly finished, and we were ready to start up the river at 10.30, we should have to have gone at a dead slow pace in order not to arrive at the dock too early. We could not remain alongside, as a Union-Castle liner was expected from South Africa, and so, with the tugs still in attendance, we anchored out in the river till noon. We were just leaving the berth when the "Castle" boat was sighted coming up The Lower Hope, and as we lay out in the river we had a magnificent view of her as she came up, swung, and berthed at Tilbury. It was the *"Dunvegan Castle,"* one of the company's very latest motorships, and her beautiful lines called forth much admiration from the officers of the *"Georgic."* The sun was now brilliant, and with her pale mauve hull, cream superstructure, and the characteristic red and black funnel, she certainly looked glorious.



Looking aft from the top of the forward funnel as the "Georgic" passed up the Thames just above Northfleet.

The hour before noon passed very quickly; ships were passing all the time, a big P. and O. liner was stealthily moving berth over in Tilbury docks, and then, just before the hour, the Pilot was on the bridge again, as dynamic as ever. "Rise and shine!" he sang out to the tug skippers below; the telegraph bell rang once more, and soon the *"Georgic"* was under way. I witnessed the last stage of the voyage from a truly marvellous point of vantage—the top of the forward funnel! But it isn't a funnel as such, at all; the whole of the exhaust from the engines passes up the after funnel, and the forward one accommodates the wireless cabin and the officers' smoke room.

As we set off up the river two tugs went on ahead to be ready to help us to get into dock. The wind was coming from the south-west now, and the belching chimneys of Northfleet cement works were spreading a veil of thick white smoke over the whole scene. Just beyond here the river swings abruptly to the north and then as sharply back again in a V-shaped bend round the Swanscombe marshes. Once clear of the cement works the atmosphere became brilliantly clear, though the sky was a hard steely blue and big banks of thundery cumulus cloud were coming up. The town of Dartford lay to the south now, lying some distance back in a fold of the hills, and ahead of us on the north bank was Purfleet. The scene is quite countrified here, and Purfleet especially is a pretty little village with some picturesque houses on the waterfront. Almost opposite is the mouth of the River Darent. There is another V-shaped loop, to the south this time, through Erith. As we rounded the bend, the heights of Shooters Hill and Bexley Heath lay across the marshes to the south, and right ahead the now overcast sky blended with a far flung greyness that hung across almost the whole horizon; beneath that pall was London.

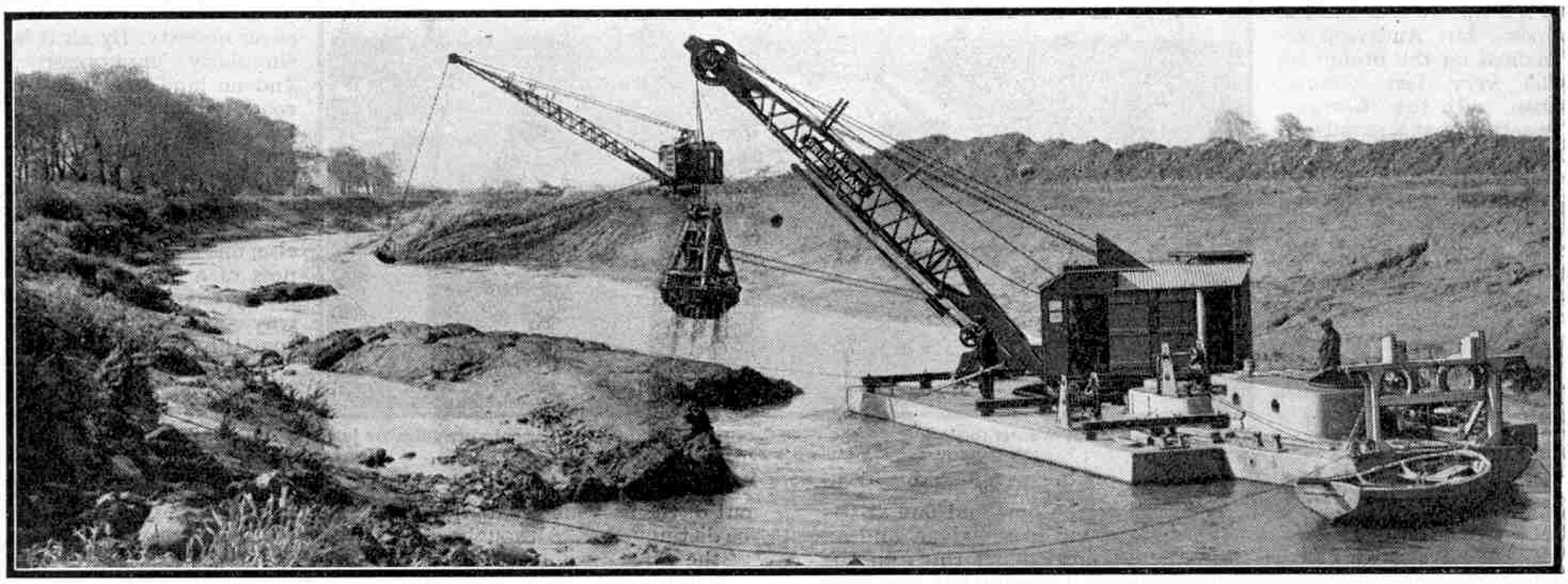
Of the many approaches to this, the mightiest city on earth, none can compare with the river for sheer majesty. By air it is singularly unimpressive, and on land, whether by road or rail, one quickly becomes lost in a labyrinth of suburbs. But the Thames is an artery of commerce the like of which exists nowhere else; one can feel the nearness of a great city, this grimy meandering waterway could not but lead to something tremendous. Two gigantic electric pylons towered one on each bank; framed in the gap between them was the amazing Ford motor works; Woolwich lay to the south-east, East Ham to the north, and out of the grey smoky distance some details of dockland could now be distinguished. Although the scene before us was a merest fraction of the whole, sailing up on a tall ship like the *"Georgic"* gives an extraordinarily vivid impression of London's vastness.

And now at last journey's end was in sight. Excepting Tilbury, the King George V Dock to which we were bound is the easternmost limit of the Port of London, and as we passed Beckton Gas Works, that very extensive and remarkably equipped factory of the Gas, Light and Coke Company, the docks were revealed behind, a veritable forest of masts and funnels. Yet this was only the merest fringe of the port. Two more tugs were waiting at the dock entrance, steel hawsers were attached fore and aft, and the *"Georgic"* was slowly swung round towards the lock gates. The wind was now catching us broadside, and when we moved slowly up towards the entrance the ship drifted to starboard and the tug at the bow looked like getting jammed against the wall; but very gradually, by judicious pulling and pushing, the ship was coaxed smoothly into the lock.

One of the busiest highways hereabouts crosses over the inner gates by means of a lifting bascule bridge. The road leads to the Woolwich ferry, and motor lorries, bicycles and red London buses were passing over in a continuous stream. Beyond the bridge, in the Albert Dock alongside, and westward as far as the eye could see, were ships—ships from every corner of the globe, ranging from passenger liners like the big P. and O. *"Naldera"* to every kind of cargo boat; and their funnels formed a perfect kaleidoscope. Then, when all was ready for us to enter, this dockland highway staged a very good imitation of a West End traffic jam right across the bascule bridge, just to give us a real London welcome as it were! This event called forth some exceedingly pithy comments from the bridge of the *"Georgic,"* where "Harry," the Dock Pilot, had taken over, but it is all part of the day's work. Another characteristic that must seem odd to a stranger is the way in which barges are allowed to drift about in the docks and river, blocking the fairway alike for collier or Transatlantic liner. And sure enough, when the bridge was at last lifted and we were entering the dock, two heavily laden coal barges were lying right in front of our berth. "Harry" was beside himself. "Go on," he bawled to one of the tug skippers, "Get 'em out 'er the way!" The tug nosed the barges aside, and then the *"Georgic"* was manœuvred into position abreast of the berth. Two tugs, one at the bow and one at the stern, pushed us broadside up to the quay, and in this quietly impressive way the voyage ended.

Swamps Turned Into Farmland

Dredging Creeks and Rivers



THERE are many parts of England where the land is flat and low-lying. Areas of this kind are found in parts of Yorkshire and Somerset, and particularly in the Fen district in East Anglia. where much of the land is actually below sea level. It is almost impossible for surface water to drain away naturally from land of this kind, which readily becomes flooded after heavy rain, and for centuries artificial channels have been dug in order to drain it and to make it fit for growing crops of various kinds. Where the land is below sea level it has been necessary to lift the water into drainage canals in order to carry it away to the sea. In the Fens windmill pumps were formerly used for this purpose, and numbers of these are still to be seen there. In modern times large electrical and Diesel driven dumping stations have been established, and many of these have to be brought hurriedly into operation in times of heavy rainfall.

Important drainage works were carried out 300 years ago by Cornelius Vermuyden, a far-sighted Dutch engineer who came to this country in 1621. Vermuyden drained the Hatfield and Bedford levels, two great swamp areas near the mouth of the Ouse and in the Fens respectively. He also carried out similar schemes in other parts of the country that brought thousands of acres into cultivation that otherwise would have remained water-logged swamps. Many of the systems he devised are still in active operation.

In later years drainage work was neglected for long periods, with the result that much land was becoming useless for farming purposes. In 1930 an Act was passed giving power to the Ministry of Agriculture to form Catchment Boards to deal with the drainage areas of all the main rivers, and very soon efforts to improve the artificial channels and natural rivers were begun. Work of this kind involves dredging and excavating on a scale far beyond the capacity of hand labour. Many of the operations indeed would have been impossible if suitable machinery had not been available.

The illustration on this page shows two suitable types of dredger working on the River Don, Yorkshire, in the area of the Ouse (Yorks.) Catchment Board. In the foreground is a floating grab dredger, and beyond it on the river bank can be seen a dragline mounted on creeper tracks.

The floating grab dredger in the illustration can be used either to dredge material from the bed of a river, or to rake out or clean small creeks. When it is employed for dredging, the material is deposited on the banks, or is loaded into barges to be towed away for disposal elsewhere. Sometimes it is spread over an adjacent field, but more frequently it is used to form flood banks to prevent the river from overflowing after heavy rains or extremely high tides.

A Priestman Floating Grab Dredger at work on the River Don, in Yorkshire. The grab has a capacity of a cubic yard and the machine dredges 75 cu. yds. per hour. On the bank of the river is a 35-ton Priestman "Lion" Diesel Dragline mounted on creeper tracks. Photograph by courtesy of Priestman Bros. Ltd., Hull.

This floating dredger has many unusual features designed to suit the peculiar conditions in which it has to work. Its height had to be kept down to 10 ft. 6 in. because of a bridge under which it had to pass. Its overall length could not exceed 53 ft. 6 in., and its draft had to be limited to 4 ft. 6 in. and its beam to 14 ft. to enable it to pass through certain locks in the area in which it works. An ingenious scheme was devised by Priestman Bros Ltd., Hull, the makers of the dredger, in order to give it the necessary stability when at work. This consists of attaching floats to the sides of the vessel, and these of course are taken away when the dredger has to pass through locks that restrict its size.

The vessel is operated by means of a Diesel engine. Its jib is 50 ft. long and the grab picks up about ½ cu. yd. of mud. When the material scooped up from the bottom of the river is being discharged into barges, however, a section of the jib is taken out, shortening it to about 30 ft. A larger grab holding a cu. yd. is used with the shorter jib.

Raking, or cleaning out small creeks, is an interesting operation for which this floating dredger is specially designed. The creeks are found on the tidal portion of the Ouse, where they are formed by surface water draining into the main river from small channels on agricultural land in the immediate neighbourhood. The raking is done from about half flood to half ebb tide, that is when the water is deepest.

The rake is dropped over the stern in the creek and the vessel drawn towards the middle of the river by means of a rope which has been previously made fast to an anchor. As the rake, which is attached to the vessel, is hauled, it scoops the mud down the creek into mid-stream to be carried away by the tide. A winch and wire ropes are used for drawing the vessel backwards and forwards, the power for this operation being derived from the main propelling engine.

Where the banks are suitable, draglines mounted on creeper tracks are usually employed for deepening and widening rivers or drainage channels. One of these machines is seen at work in the background of our illustration. The bucket is dropped or thrown out into the river, and is then drawn towards the machine by means of a wire rope. It scoops up the mud as it is hauled along, and when full it is hoisted by a second rope and the jib is slewed, when an ingenious mechanism tips the bucket and discharges the material. This generally is used to form a flood bank.

Formerly machines of this type were driven by steam, but of late years the practice has been to use Diesel engines. The excavators themselves vary according to the nature of the work, and jibs up to 70 ft. in length are used where wide rivers have to be dredged.

Machining a 58-Ton Forging

How Slots are Cut in a Giant Rotor

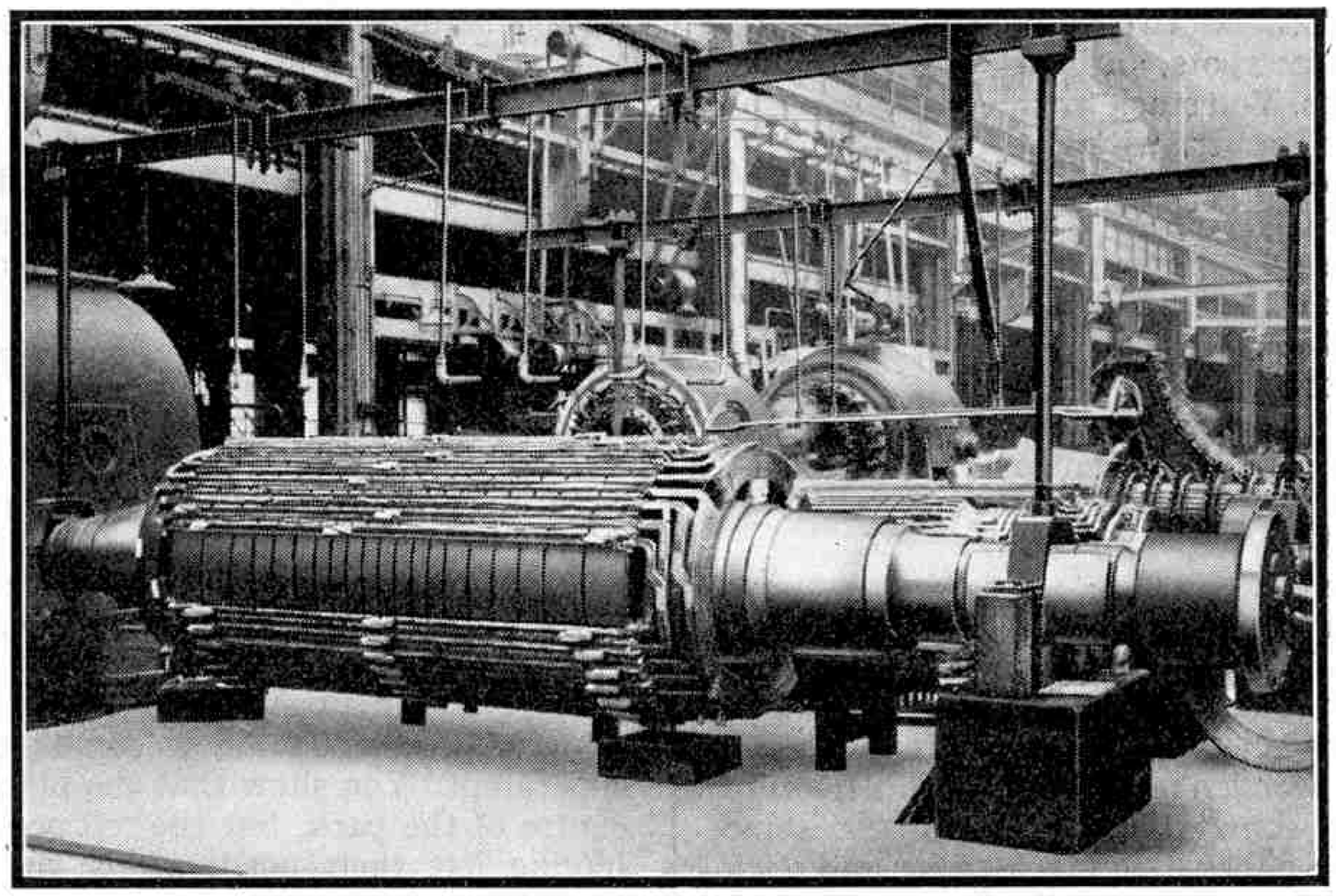
OUR cover this month shows a planing machine cutting slots in the rotor of a large alternator. The purpose of the slots is to accommodate copper coils or windings through which the current generated passes.

The production of a huge rotor of this kind is work of great engineering interest. The one shown on our cover was made from a single solid forging weighing 58 tons, and when it was finished its weight was still 43 tons, 15 tons of metal having been removed in the machining operations, including slot cutting. Its total length, including the shaft, is 30 ft. and the cylindrical portion alone is 14 ft. long.

This rotor forms part of a 50,000 kVA turbo-alternator that is driven by a steam turbine of 55,000 h.p. and generates current at 6,600 v. When it is in service every particle on its main cylindrical surface is whirled round at a speed of 240 m.p.h., or four miles a minute. This gives rise to powerful centrifugal forces, and for this reason it is necessary to subject every rotor of this kind to careful inspection and testing. In one of these tests a hole is bored right through the centre of the rotor and its shaft from end to end, so that the metal in its interior can be inspected by means of a special instrument that is a combination of telescope, a periscope and a microscope. In addition pieces of the material employed in making it are tested in order to make sure that the steel of which it consists is of the quality required. Finally the rotor, complete with its coils and the rings that retain their ends, is run at a speed 20 per cent. above that at which it will rotate when it is actually set to work. This is what is known as the over-speed test. It is carried out in a special testing house with heavy concrete walls and ramparts of sandbags, in order to prevent damage if the rotor should give way under the immense forces acting upon it. This of course is scarcely likely, as an ample margin of strength is allowed, but only when a rotor has passed satisfactorily through this and other tests is it put into operation.

The machine on which the slots for the windings are cut has a table 26 ft. long and 10 ft. wide. This weighs 30 tons and when the rotor is in position on it, the total weight is equal to that of five double-decked tramcars. In spite of this huge weight, an electric motor controlled by automatic switch gear drives the table forward at a speed of from 30 ft. to 60 ft. a minute when the cutting tools are at work, and returns it in readiness for a new cut at twice this speed. Cone-shaped rollers rotating in oil baths in the slides serve to lubricate the moving parts by carrying oil to the bearing surfaces of the table. Two of these rollers, one on each of the slides, can be seen on our cover.

The tools that cut out the slots are carried in holders that can be mounted on the side columns of the machine or on the cross slide, as required. They are capable of being set at any angle, and a small motor is mounted on the top of the cross beam in order to enable them to be moved easily and quickly. The tools cut through the metal at high speed, and a stream of cooling liquid, consisting of an emulsion of oil and water, is poured over their edges in order to prevent them from becoming too hot. This liquid can be seen running out of the slots that are being machined.



Packing the copper coils or windings in the slots of the rotor of a turbo-alternator. Photograph by courtesy of Metropolitan-Vickers Electrical Co. Ltd.

An interesting feature is the manner in which the rotor is turned round when one pair of slots have been machined, and another pair are to be cut. The operator slackens off the tie bolts that hold the work rigidly on the table, and turns the rotor through the necessary angle by means of screw jacks. The tools are then set to cut the new slots radially, that is along lines radiating from the centre line of the rotor shaft, and the tie bolts are again tightened before beginning operations. The greatest accuracy is necessary in work of this kind, for the coils or windings to be placed in the slot must not move when the rotor is running at high speed in the finished alternator. The rotor indeed is so carefully balanced that it will remain stationary in any position when the shaft is supported on two horizontal parallel knife edges, and it runs at full speed without vibration of any kind.

Even larger rotors than that shown on our cover are now made. A notable example is that of the 105,000 kW turbo alternator installed by the Metropolitan-Vickers Electrical Co. Ltd. in the Battersea Power Station. This is the largest generating unit in Europe, and was described and illustrated in the *"M.M."* for August of this year. The rotor of this alternator weighs 82 tons, and is made in three pieces held together by means of links of high tensile steel shrunk into position after being expanded by heating.

Puzzle Your Sharp-Eyed Friends

Home Made Magic that Needs no Skill

By Norman Hunter (From Maskelyne's Mysteries)

FIRST of all, let me repeat the advice I have given previously—try every trick over in private before you attempt to perform it in front of an audience. You cannot expect to do even the easiest trick smoothly and convincingly first time, but once you have got the hang of it by a few rehearsals, you will find you can do it more or less without thinking about it. This leaves you free to devote your attention to making the trick amusing and bringing out its chief points.

Now for the first mystery.

DEMON DICE

The dice are large ones, about two or three inches square. Two are black with white spots, and one is white with black spots. You stack them on an inverted glass tumbler, with the white die in the centre, and throw over them a large handkerchief. Then "Hey presto!" The audience see a mysterious movement of the dice under the covering handkerchief. When the handkerchief is whisked off there are only the two black dice left; the white one has vanished from between them. You then stroll over to a hat, which you have previously shown empty, turn it over, and out falls the missing white die.

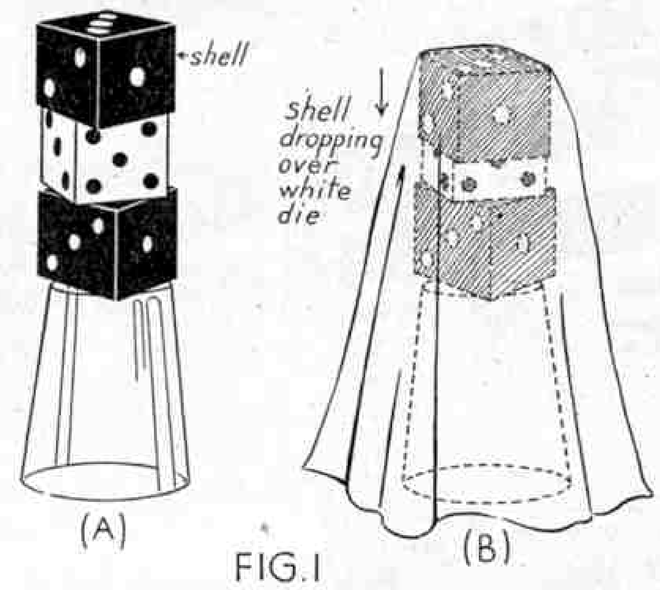


FIG. 1

How it is done. Of the three dice that the audience see, one of the black ones is a hollow sham. Actually it is a cardboard case that fits snugly but easily over the white die. You can make the whole apparatus easily enough. All you need are a few wooden cubes, children's picture blocks will do nicely; some thin cardboard and some paper. Cover one of the cubes with black paper and stick white paper discs on it to represent a die. Cover two more cubes with white paper and stick black spots on them. Then make a cardboard case to fit over the cubes, and cover this with black paper and spot it to look like a black die.

You will notice that you have one solid black die, one shell black die, and two solid white dice. You will also require a good-sized coloured handkerchief, a hat, and a glass tumbler.

To start with, one of the white dice is inside the shell, so that there appear to be two black and one white dice. In handling them you will of course be careful not to expose the white side of the black shell. Show the hat empty and casually put the three dice inside, saying that this is a very compact trick because all the apparatus can be carried in your hat. Now take the dice out again; first the solid black die, then the solid white die, and finally the black shell, leaving the second white die in the hat. The audience have seen you put three dice into the hat and take three dice out of it, so that they naturally conclude that the hat is empty.

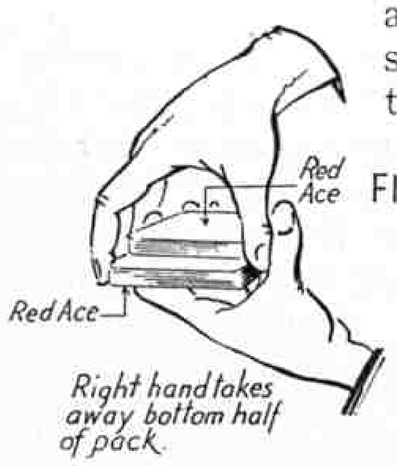


FIG. 2

Put the hat on one side and stack the dice on an inverted glass. The solid black goes at the bottom, then the white, and the black shell, open side downward, is placed on top. The dice are not stacked quite square, otherwise the shell would slide down over the white die. The shell is placed slightly cornerwise on the white die.

Now throw the handkerchief over the dice. Hold one corner of the handkerchief, and give the top die, which is the shell, a tap with one finger. Tap it just hard enough to square it up with the white die. The black shell will at once slide down over the white die, so that when you draw off the handkerchief the white die has seemingly vanished from between the two black ones. Turn over the hat and the duplicate white die falls out.

Fig. 1 will explain the way in which the shell drops over the white die.

Here is a very simple, but exceedingly baffling card trick.

THE AFFECTIONATE ACES

From a pack of cards you remove the four aces. The pack may be examined to prove that no duplicate aces remain hidden in it. The red aces are placed one at the top of the pack and one on the bottom, while the two black aces are put in the middle of the pack.

"The aces in a pack are very fond of one another," you remark. "See how they come together again when separated!" You show that the black aces are still in the centre of the pack, but the red aces are now with them, having left their positions on the top and bottom of the pack.

How it is done. At first glance this sounds like a trick that needs exceedingly twiddly fingers, but actually it is quite easy.

When you put the red aces on the top and the bottom of the pack, this part of the trick is quite genuine. The deceptive part comes when you cut the pack for the black aces to be placed in the centre. Instead of lifting the top half off the pack to make the cut, you lift the bottom half. To do this you must grip a packet of cards at the bottom of the pack and draw them out sideways. The audience, not knowing what you are going to do, will not suspect that the pack has been cut in any but a straightforward manner. Now have the two black aces placed on the presumed lower half of the pack. As this is really the top half of the pack, the black aces go on top of the red ace that is already there. When you bring the two halves of the pack together, the other red ace, which is on the bottom of the other packet, comes immediately above the black aces. Thus the four aces are brought together in the centre of the pack, and the trick is done

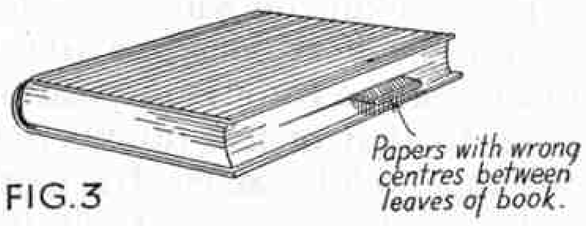


FIG. 3

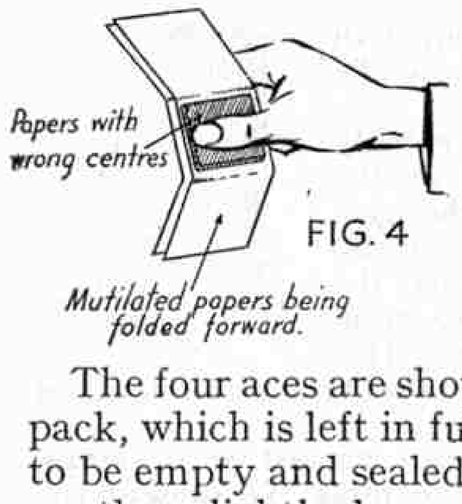


FIG. 4

before the audience realise that you have started to do it.

Reference to Fig. 2 will make everything clear.

A good trick to follow this I will call

THE TRAVELLING ACES

The four aces are shown and placed openly on top of the pack, which is left in full view while an envelope is shown to be empty and sealed. This envelope is then enclosed in another slightly larger, which in turn goes into a third larger still. Each envelope is marked by a member of the audience.

You now take the pack and deal off cards from the top. The aces are no longer there, and when the three envelopes are opened the missing aces are discovered inside the smallest one. And the marks on the envelopes prove them to be the ones originally sealed up empty!

How it is done. For this trick you will need four aces taken from another pack with backs of the same pattern as those you are using. You also want four envelopes, a nest of three and a duplicate of the smallest envelope. To prepare, place the four extra aces in one of the small envelopes and put this envelope into the middle sized envelope.

To perform, hand the four aces for inspection, and while attention is drawn to them, quietly turn the halves of the pack face to face. Take back the aces and place them openly on top of the pack. As you turn to put the pack on the table you will find it quite easy to turn the pack over. To the audience nothing unusual has been done, but of course when you next deal cards from the top of the pack you are really dealing from the opposite side, and therefore the aces are no longer there.

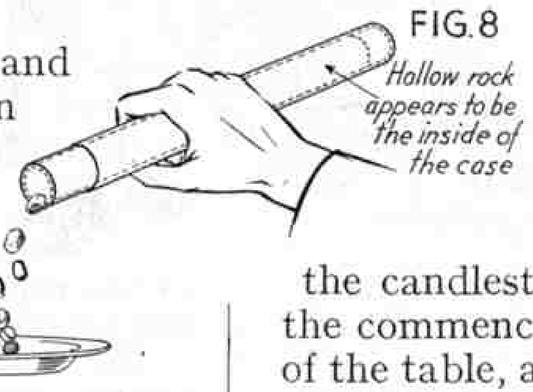


FIG. 8

Now for the envelopes. Take the smallest empty envelope and ask someone to seal it. Place it into the next larger envelope, but immediately draw out the envelope containing the aces, saying: "To make everything quite fair I should like someone to mark the envelope in some way, say with his initials." Of course it is the envelope containing the aces which is thus marked, but the audience having no knowledge of the exchange have no reason to suspect anything. The larger envelope is then sealed and marked and enclosed in the third envelope. When the envelopes are opened you ask the person who marked the outer one to verify his mark, open it, and hand you the one inside. You have this mark verified, open it yourself, and draw out the marked envelope containing the aces. This you can safely hand to a member of the audience to open while you calmly screw the other envelopes into a ball and drop them safely out of the way, thereby hiding all evidence of how the mystery was accomplished.

As a change from card tricks here is an easy version of a very effective stage trick.

THE PECULIAR PAPERS

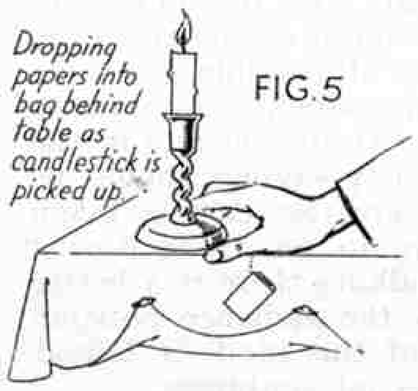


FIG. 5

You have two sheets of tissue paper measuring about twelve inches square. One is blue and the other yellow. You cut a roughly circular piece from the centre of each, fold all the papers together, and warm them over the flame of a candle to restore them. But the trick goes wrong, and when the papers are unfolded the yellow piece has a blue centre and vice versa. Saying that you didn't warm them long enough, you strike a match and set fire to the papers. As they burn down you blow the ashes away, and immediately unfold the papers, completely restored, one piece entirely blue and the other entirely yellow.

FIG. 6

How it is done. To begin with you have the two papers with the wrong centres folded into a small packet and inserted between the leaves of a largish book. The book rests on your table with its back to the audience, as shown in Fig. 3. You show the blue and yellow papers, and with a pair of scissors cut a roughly circular piece from each. Now lay these two circular pieces on the book, allowing them to hang over the back a little. Show the mutilated sheets and push your hand through the holes to prove that the papers are really cut. Pick up the two cut-out discs, and in doing so pick up behind them the folded papers from the book. Place the mutilated sheets in front of the cut circles, and fold the papers forward into a packet pretty much like the packet you have concealed. See Fig. 4.

Hold the two packets in your hand as one, and let the audience see that you have nothing concealed in your hand. Take the packet of wrong centre papers in your left, leaving the others concealed in your partly closed right hand. With this hand pick up the candlestick, the candle having been lighted before the commencement of the trick. It stands near the back of the table, and as you pick it up you drop the concealed papers into a little pocket made by pinning up the rear portion of the tablecloth (Fig. 5).

You now proceed to warm the visible papers over the flame of the candle, blow out the candle, and open out the papers. Of course the audience see at once that the wrong centres have been restored, and the result is a good laugh. Explaining that you didn't warm the papers enough, you draw them out into a sort of rough spill and pick up a box of matches. The drawer of the matchbox is pushed half out, and in the space so formed in the outer case is concealed a packet composed of two plain papers, a blue and a yellow, identical with those you first used. Strike a match and light the papers in your hand. As they begin to burn close the matchbox and so automatically thrust the folded papers into your hand, where you keep them concealed (Fig. 6). As the papers burn away, blow the ashes into the air and instantly unfold the two restored papers.

If you like you can vary the finish of the trick, and instead of producing the papers restored you can produce a large sheet, two feet square, composed of alternate stripes of blue and yellow. Or again you can produce blue and yellow silk handkerchiefs.

Here is a quick and very easy trick.

SEASIDE ROCK

You show a stick of seaside rock and its cardboard case. The case is obviously empty. You put the rock into the case, throw it into the air, catch it, open the case, and instead of the rock a shower of little sweets pour out. The missing rock is produced from your pocket.

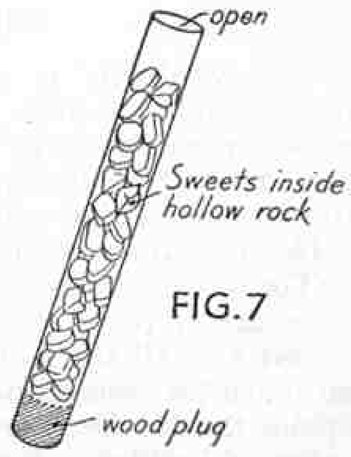


FIG. 7

How it is done. The cardboard case is quite unprepared, but the stick of rock

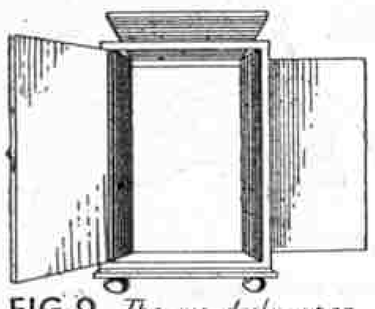


FIG. 9 *The wardrobe open and empty*

is really a cardboard tube, closed at one end and painted to resemble a stick of rock. It must fit snugly and fairly tightly into the cardboard case. The best way to arrange things is to buy a stick of rock in a tubular case. Use the rock as a mould to roll a tube from thick paper, gluing the paper well down. Insert a little piece of wooden rod in one end and paint the hollow fake to look like the real rock. Fill the hollow rock with small sweets and put the real rock into your pocket. Fig. 7 shows the hollow rock ready prepared.

Performing, show the false stick of rock and make it quite clear that the case is empty. Push the hollow stick into the case, solid end down. Put on the lid, throw the case into the air, and take the lid off. Pour out the sweets, and the case can again be shown empty because the inside of the hollow rock will look like the inside of the case. See Fig. 8. Finish by producing the real rock from your pocket, and give it to someone in the audience if you feel generous. If you like, instead of changing the rock to sweets you can fill the hollow rock with little flags, or a string of ribbons of different colours, or indeed anything of a suitable nature that will go into it.

The next trick is another very easy one, but the effect is most magical. I call it

THE UN-CUTTABLE RIBBON

You have a length of ribbon examined, also a pair of scissors. Taking the ribbon near the centre you proceed to cut a piece off. The audience see the cut piece fall off, yet, by simply rubbing the ribbon with your fingers, you cause it to be restored and everything can be examined again.

How it is done. All you need for this trick are a pair of scissors and about three yards of ribbon. Cut a piece about two inches long from one end of the ribbon. Now for the whole secret. The scissors used for the trick are fairly large ones, but they are blunt. They will cut paper, but they will not cut the fabric of the ribbon.

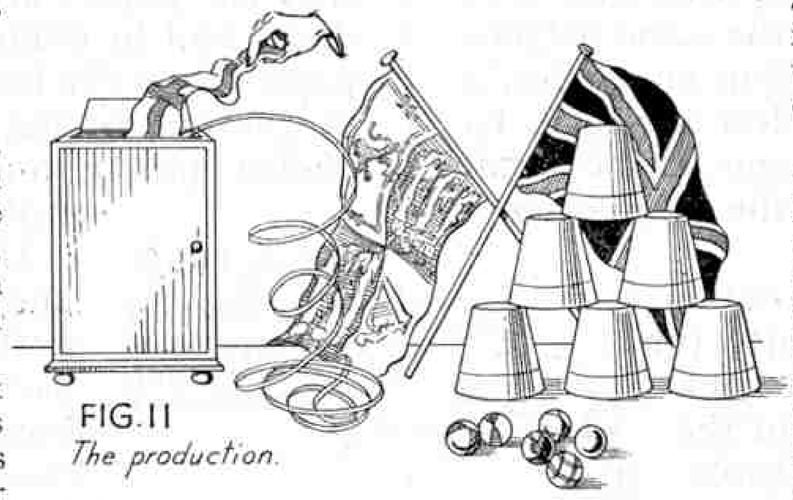


FIG. 11 *The production.*

Fold the little piece of ribbon and have it in your waistcoat pocket. Give out ribbon and scissors to be examined. Secure the short piece of ribbon from your pocket and conceal it in your right hand. Take the long ribbon by the centre in the same hand, pressing the short piece against the long one. Hold the two together, and with the scissors apparently cut the ribbon. The scissors merely pinch the two pieces of ribbon together, and as you instantly open the blades of the scissors, the little piece of ribbon will flutter to the floor, having apparently been cut from the long piece. The rest of the trick is merely a matter of making passes and looking as mysterious as possible before you show that the ribbon is whole again.

Another version of the trick makes use of a piece of paper, and no short piece of ribbon is needed. Fold a sheet of thickish writing paper down the centre, lay the middle of a length of ribbon along the fold, and bring the sides of the paper together, making a sort of sandwich of the ribbon. Take your scissors—they are blunt as before—and boldly cut across the centre of the paper, thus apparently cutting the ribbon as well. Hold the two sides of the paper as you cut, or better still get two members of the audience to hold the paper, one on each side. Then put down the scissors and slide the two halves of the cut paper away from the middle, revealing that the ribbon has become restored. The scissors, being blunt, will not cut through the ribbon, but they will cut the stiff paper quite easily.

Now let us have one of those showy tricks in which no end of unlikely articles are produced apparently from nowhere.

CONJURER'S WARDROBE

The wardrobe is a miniature affair measuring about fifteen inches high by nine inches wide and five inches deep. You can make it easily from plywood, and decorate it with mouldings, etc., to suit your fancy. It has a door back and front, and the top is hinged like a lid. Four feet are fitted to raise it above the table and allow a clear view underneath.

The wardrobe is first opened as shown in Fig. 9, and the audience are allowed to see right through. The doors and top are closed and all sides of the wardrobe are shown. There is evidently no place for concealing even a handkerchief, yet when the conjurer opens the lid he takes out dozens of flags, some on long staves, coloured goblets, dozens of yards of paper ribbon, bunches of flowers, paper garlands, and to finish up with a shower of confetti which alone makes a pile as big as the wardrobe.

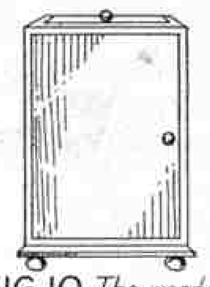


FIG. 10 *The wardrobe closed*

How it is done. The wardrobe is made exactly as it appears. The front door is hinged on the opposite side to the back door. Inside the back door is fitted a box made of thin wood or tin. This box is an inch smaller all round than the door, and the sides slope inward away from the door. The top of the box is open. This forms the container for the load of articles to be produced, of which more in a moment.

When the load compartment has been packed with things, the wardrobe is closed and placed on the table. To present the trick, open the back door first, that is most important; then open the front door, and finally the lid. As you will see from Fig. 12, the load is entirely concealed behind the back door but the cabinet appears to be empty. The fact that something may be hidden behind the back door never occurs to anyone because they think they see both sides of both doors as the cabinet is opened and closed.

Having shown the cabinet empty, rattle a stick inside or put your hand through to prove the absence of mirrors, close the doors. This time you close the lid first, then the front door, and the back door last. In this way the load is concealed the whole time. Pick up the wardrobe and show all sides of it, put it down, open the lid and take out the articles.

Now for the actual things to be produced. Silk handkerchiefs of course are excellent, as they can be packed into small space. So are silk flags. To make flagstaffs, take strips of tough brown paper and roll them up, paste the ends down, and pull them out from the centre. They will form quite rigid-looking poles, and they can be closed into very little space. Attach the flags to these poles by sewing a few rings along one side of each flag. Fasten one corner of the flag to a wooden knob glued into the inside of the roll, and let the rings drop down over the pole as it is drawn out.

The goblets are ordinary cream cartons, painted different colours, and some gold and silver. A dozen will nest together in little more space than that occupied by one, and the inside goblet can be filled with handkerchiefs. The bunches of flowers are imitation ones, made from feathers and obtainable at most drapery shops. The confetti is put into the container first and packed down tight. If this is done the confetti when shaken out loose at the finish will make a large pile, even though it occupies only an inch or two when rammed into the container. Don't forget to shake it out on to a tray or sheet of paper and not on to the carpet, if you want to retain the popularity your performance will, we hope, create for you.

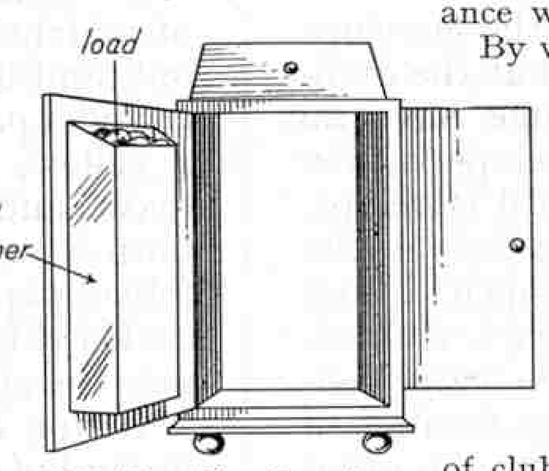


FIG. 12 *The Secret. Back view of wardrobe.*

By way of a change we will end with a trick that is really a sort of joke, but it makes an amusing surprise.

NAME THE BOTTOM CARD

You take several cards and lay them face upward on the palm of your hand, allowing the audience to see what each card is, and reading the names aloud. Suppose they are the four of clubs, the queen of hearts and the ten of diamonds. You show them again and ask someone to name the bottom card. Of course he will say it is the four of clubs, that card having been quite obviously placed at the bottom of the heap. "No," you say, "I am afraid you are wrong. The bottom card is the queen of hearts." You then proceed to work up a little argument by trying to persuade someone to say that he agrees with you and that the bottom card is the queen. Naturally, the more you try to persuade, the more the audience will insist that you are wrong. You then quietly lift up all the cards, saying: "I am right, the *bottom* card is the queen of hearts." And so it is. Under the bottom card you have previously hidden a miniature patience card, and this miniature card is of course the queen of hearts. The laugh is on the audience.

In conclusion, let me emphasise that, if at all possible, the same trick should not be repeated before the same audience. In order to distract the attention of the audience at critical moments in the performance of a trick a few jokes and witty sayings should be selected and memorised. Even when the greatest care is taken it is always possible for some little thing to go wrong during a trick, and if the conjurer can keep on talking there is a better chance of remedying the mistake without the audience noticing that anything has occurred. A situation of this kind is bound to arise now and then even with professional conjurers.

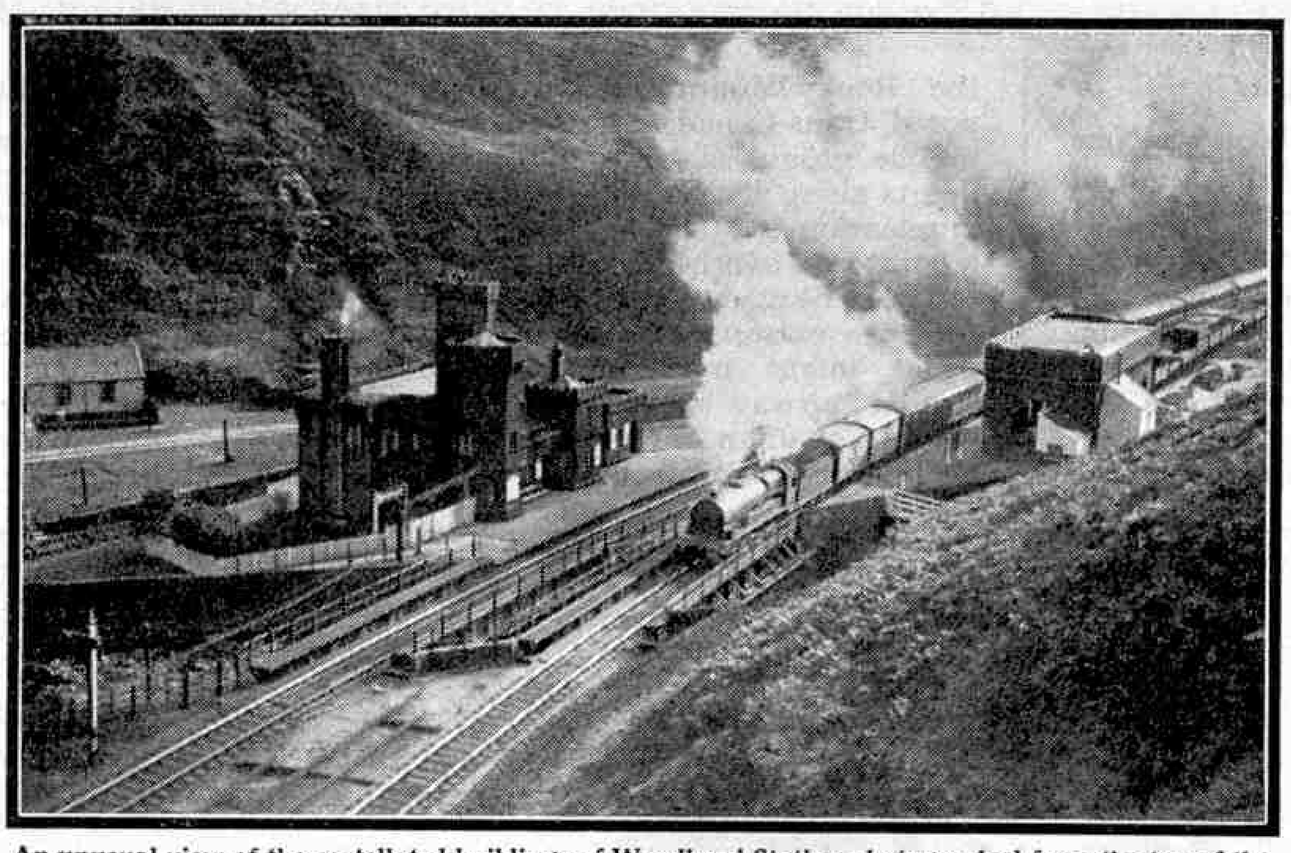
Boring Woodhead Tunnel

A Pioneer Railway Engineering Feat

TO ordinary travellers tunnels are perhaps the least attractive features of a railway. Often enough, just when they are enjoying a picturesque country scene, or an attractive view of hills and mountains, their train plunges into the blackness of one of these underground bores, through which it roars and clanks, while unpleasant fumes invade their compartments unless they hasten to close the windows.

Yet railways without tunnels are almost unthinkable, and on at least one occasion a tunnel was purposely introduced in the course of a railway in order to give passengers the thrill of travelling through it. This happened when the Canterbury and Whitstable Railwas was built in the early days of railways. It is said that the promoters of the railway insisted on a tunnel, and George Stephenson was called in to plan a route "with a nice tunnel in it" in place of the level and easy line previously selected by the surveyor.

To a railway enthusiast a tunnel is always of interest, especially when it is a long one that represents a triumph of engineering achievement. The Woodhead Tunnel on the Manchester and Sheffield line of the Great Central section of the L.N.E.R. is an example of this. It is the longest on the L.N.E.R. system and, apart from the London tubes, there are only three longer railway tunnels in the British Isles. From end to end it measures 13 yds. more than three miles, and it was built almost a century ago, when Sheffield and Manchester were being connected by rail. It is remarkable that a tunnel of this size should have been planned in the pioneer days of railway construction, when the powerful drills and explosives used by the engineers of to-day were not available. The task of constructing it was the most formidable that railway engineers had then been called upon to face.

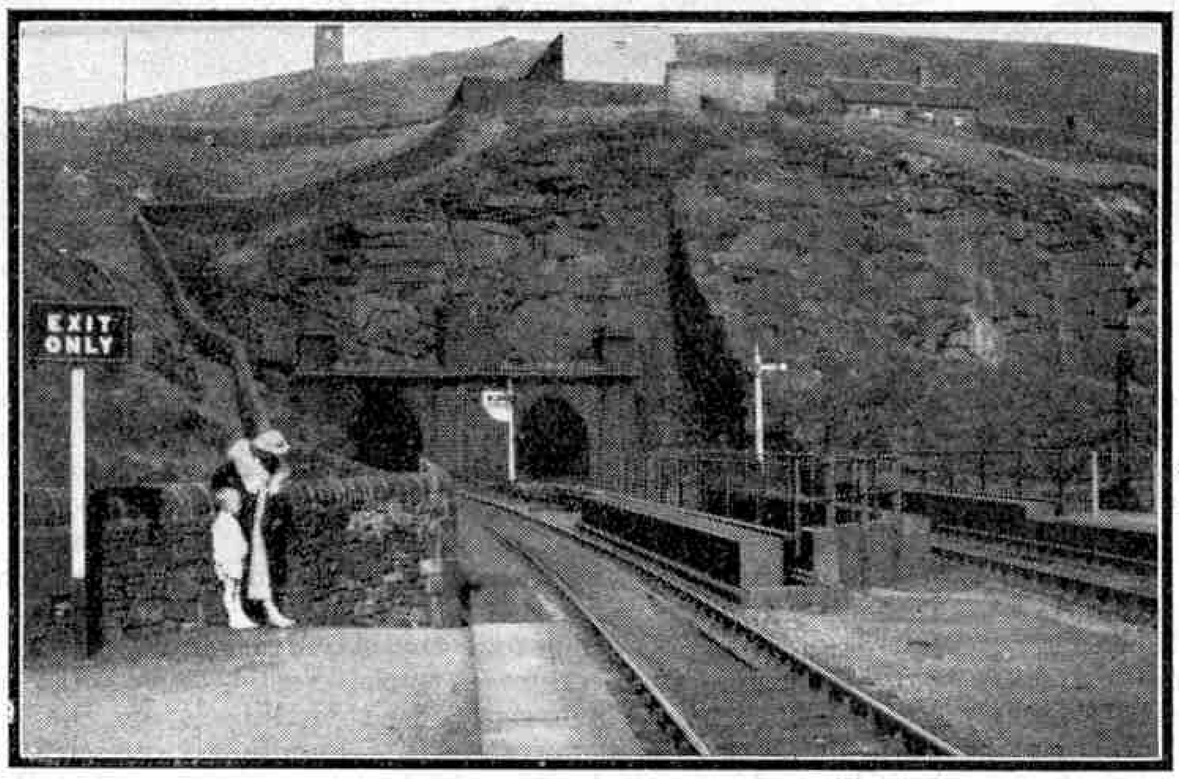


An unusual view of the castellated buildings of Woodhead Station photographed from the top of the embankment at the mouth of Woodhead Tunnel. The two photographs on this page are by A. Phillips, Ashton-under-Lyne.

In spite of the example set by the promoters of the Whitstable and Canterbury Railway, railway engineers do not seek opportunities for making tunnels. When it is necessary to pass through high ground, a cutting is made if possible, but it is cheaper to tunnel if the depth is greater than about 75 ft. The purpose of Woodhead Tunnel was to enable the new railway to penetrate the Pennine Range between Woodhead and Dunford. Most tunnels have a single bore, but in this case separate tunnels were provided for the up and down tracks respectively. The boring of the down tunnel began in 1838 and was completed in 1845, when single line working was then brought into operation. Two years later the second bore was begun, and this was opened for traffic in February, 1852.

The first step towards the construction of a tunnel is the setting out or surveying of the centre line over the route to be followed. Observation towers, or observatories, as they are called, are then built at prominent points along the line. A typical tower is about 30 ft. in height, and circular stairs lead to the top, where there is a heavy stone block carrying a bronze plate on which the actual centre line is engraved. The sites of the towers are carefully chosen so that they command a view of the whole of the ground under which the tunnel is to run, and the necessary observations are made through openings in their walls. With the line they mark as a guide, the tunnel can then be driven into the hillside with such accuracy that workings from both ends eventually meet with almost uncanny precision.

Some of the observation towers built for the construction of Woodhead Tunnel still stand. One of them can be seen from the platform at Woodhead Station, as shown in the lower illustration on this page. A rough track drained by ditches was constructed over the moor to connect the observation points with five places where vertical shafts were sunk to the line of the tunnel. The average depth of these shafts was 515 ft., and their purpose was to enable several working faces to be opened out at the same time in order to speed up the task of boring. Gunpowder was used for blasting, and the holes in which it was placed were made by driving drills into the rock by means of heavy hammers. The tunnel passed through sandstone and millstone grit, a very hard rock, and altogether it was necessary to use over 150 tons of gunpowder in blasting a way through. The material broken away at each face was removed to the foot of the shaft from which tunnelling operations in that heading were being carried on, and was then hauled to the surface by means of gearing driven by steam engines. This of course was not necessary in dealing with the spoil from the headings driven from the ends of the tunnel.

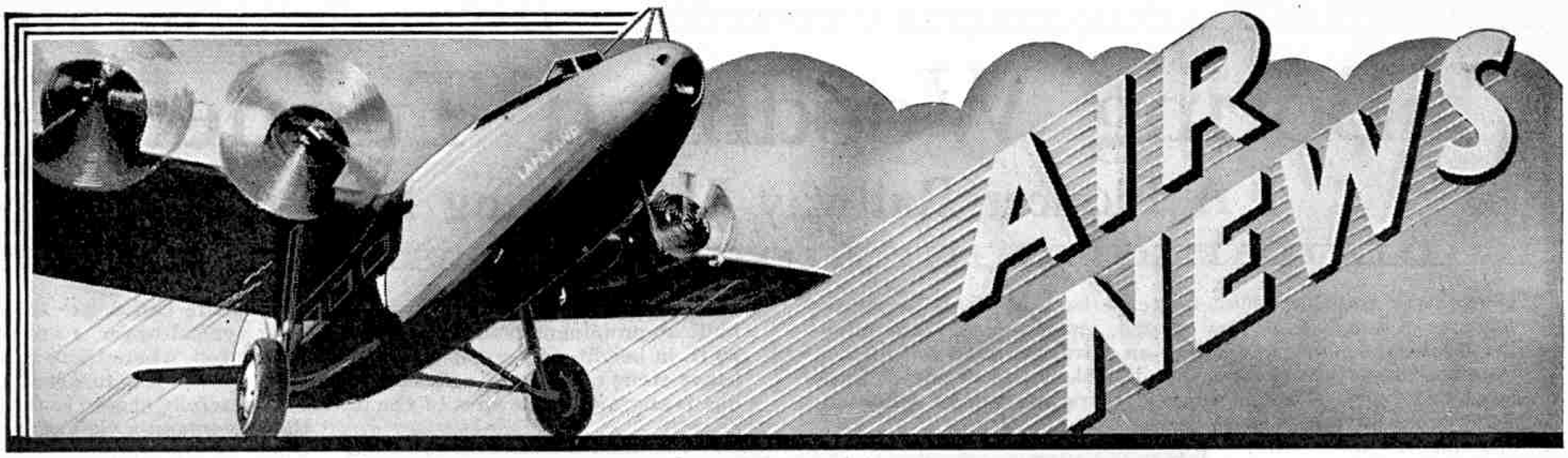


The double bore of Woodhead Tunnel seen from the station. One of the observatories used for making the line of the tunnel during construction can be seen above the tunnel on the left.

Work necessarily proceeded slowly in comparison with tunnelling operations in modern times. The men engaged underground had only lamps and candles to guide them, and difficulties were caused by water flowing in, nearly 2,000 million gallons being pumped out before the tunnel was finished. A stone lining was built, and it is probable that the material required was brought from a large quarry near one of the shafts, down which it was lowered.

The position of the tunnel added to the difficulties of the work, for it is far removed from populous centres and throughout the years of construction the several hundred men engaged in it had to be housed in stone huts that were thatched or roofed over with flagstones. Remains of some of these camps can still be seen on the moors under which the tunnel passes.

After almost 100 years of service, Woodhead Tunnel is still an important link between the east and west of England.



Recent Record Flights

Miss Jean Batten, the well-known New Zealand airwoman, has flown from England to New Zealand in the record time of 11 days 1 hr. 25 min. This 14,000-mile flight involved the crossing of the Timor and Tasman Seas. Miss Batten reached Australia in the record time of 5 days 21 hrs., and efforts were made there to persuade her not to attempt the perilous flight across the Tasman Sea to New Zealand, as her machine, a Percival "Vega Gull," is of the single-engined type. Miss Batten was determined to continue by air to her native land, however. After waiting several days for favourable weather she eventually took off from Richmond, New South Wales, and accomplished the long sea crossing of 1,200 miles in about 8½ hrs.

Flights across the Atlantic Ocean have long since ceased to be a novelty, or to have any real value, but the recent fast crossing by air made by Mr. J. Mollison deserves mention. Mr. Mollison took off from Harbour Grace, Newfoundland, on 29th October and landed at Croydon airport next morning, having covered the distance of 2,300 miles in the record time of 13 hr. 17 min. His machine was a Bellanca single-engined monoplane. Mr. Mollison has now flown across the Atlantic three times, and is the only airman to have done so in aeroplanes.

The non-stop flight from Burban, California, to Columbus, Ohio, a distance of 1,986 miles, made by Mr. R. N. Buck, a young American airman, has been recognised by the Federation Aeronautique Internationale as a new world record for light aircraft. The time taken for the flight was 17 hr. 50 min., and the distance covered was 177 miles greater than the previous record, set up by two French pilots in 1932.

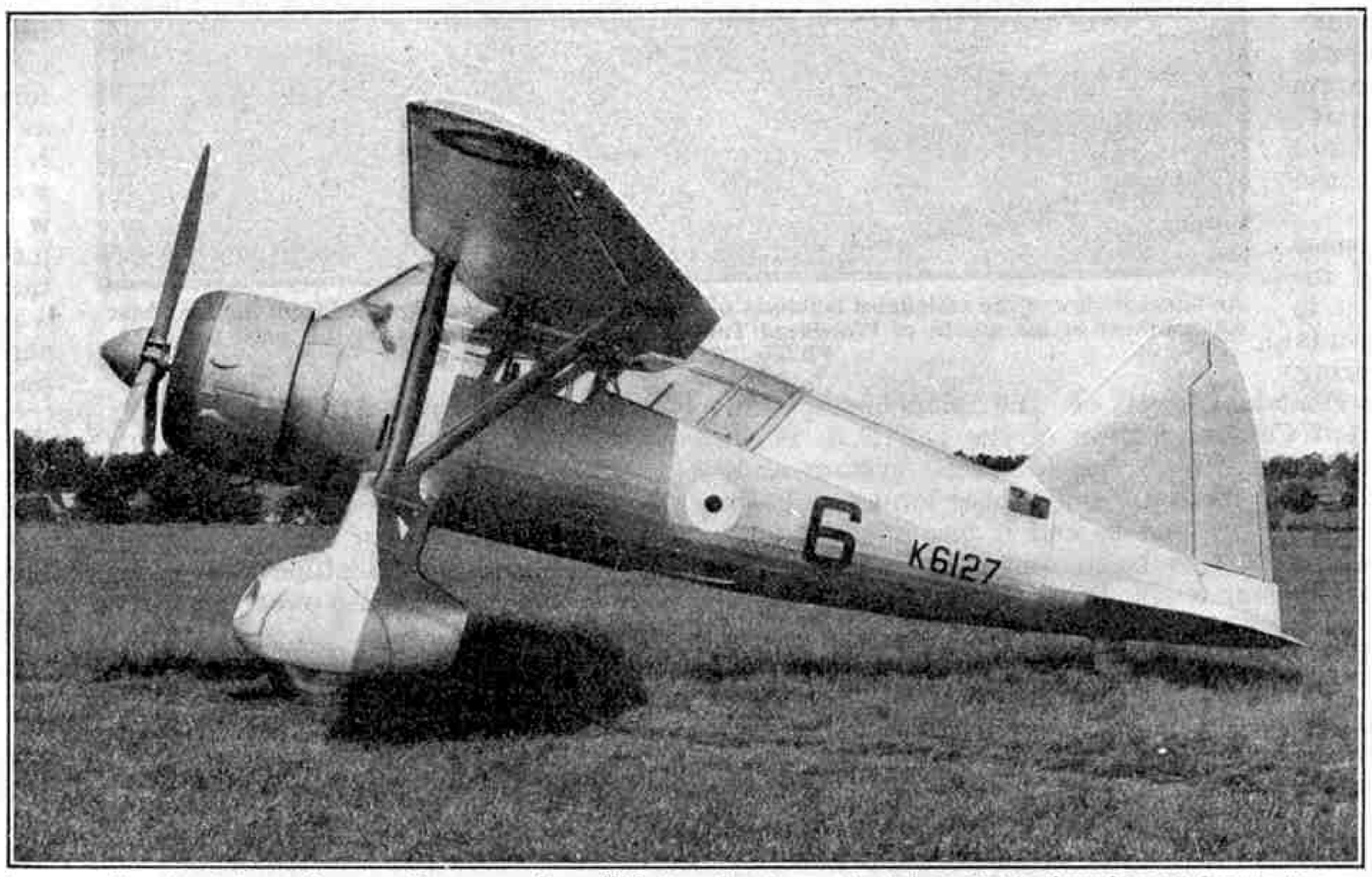
Airways Round The World

An aeroplane equipped as an experimental wireless laboratory, and ground wireless stations fitted up in big motor lorries, are being used in tests to determine the best positions for wireless stations across the Rocky Mountains section of the proposed trans-Canada air mail service. The mobile ground-stations move to different points along the mountains and then communication is established with the "flying laboratory" overhead. In this way practical tests can be made as to any abnormal effects that the existence of the many mountain peaks might have on the working of regular airway wireless beacons.

The Canadian Minister of Transport has announced that air mail services on the prairie sections of the trans-Canada route will be in operation next spring. Later in the spring it is intended to inaugurate the sections across the Rockies to Vancouver, and to have the entire air mail service across Canada in regular operation by July. This service will provide a vital link in the system of Empire airways, and in long-distance air transport round the world. When it is in operation loads flown across the Atlantic from England can be taken on to the Western Coast of North America, and then by flying-boat services across the Pacific to Hong Kong and the chief seaports of Australia. From these Pacific services there will be connections with the main air routes from China and Australia to India, Egypt, Africa, and England.

* * * *

Doncaster Airport now has a short wave wireless station to help wireless-equipped aircraft approaching the airport, when they come within the controlled zone, an area of five miles around the airport.



The new Westland Army Co-operation monoplane. This type has been adopted as standard equipment for the R.A.F.
Photograph by courtesy of Westland Aircraft Ltd.

Air Race from New York to Paris

An air race across the Atlantic Ocean from New York to Paris will be held on 21st May next year. This date has been chosen because it is the 10th anniversary of Lindbergh's historic solo flight from New York to Paris. The race will be flown in accordance with the rules of the International Aeronautical Federation, and as there are few restrictions, an interesting and representative range of machines should be entered. Any type of landplane will be eligible, but seaplanes and flying boats will not be allowed to compete. The machines taking part will have to carry distinctive markings on their engines, wings and fuselages, in order to render identification easy, and each will have to be equipped with a wireless transmitting and receiving set not more than 125 lb. in weight. The total number of the crew that can be carried will be limited only by the capacity of the machine.

The first prize in this Atlantic air race will be £5,000 and one half the entrance money, and the second and third prizes will be £3,000 and £2,000 respectively. The distance to be covered is about 3,645 miles, and the time limit of 40 hr. decided upon, means that the competing aircraft must fly at an average speed of at least 90 m.p.h. to keep within that time. The French Air Ministry intend to enter three machines for the race.

A Flying Motor Car

Flight and road tests are being carried out by the United States Bureau of Air Commerce with a new Pitcairn "Autogiro," fitted with a Pobjoy "Cascade" supercharged engine of 110 h.p. The machine is designed to fly through the air at 115 m.p.h., and to travel along a road at 25 m.p.h. When not in use the rotating wings can be folded along the top of the fuselage, which has a saloon body similar to that of a motor car. When the "Autogiro" is on the ground, the drive of the engine can be diverted from the airscrew to the landing wheels by means of a clutch mechanism, and the machine can then be steered and handled like a motor car.

More Aerodromes

A fine airport was completed recently at Bordeaux. The main building faces an extensive landing area and is of reinforced concrete, and owing to the soft nature of the ground it is built upon a foundation of 102 columns sunk down to firm soil. The central part of the building has three storeys, and a conspicuous feature of it is a tower 37 ft. in height, in which are the control and meteorological observation rooms. There is a powerful beacon on the roof of the tower.

A new aerodrome has also been opened at Ypenburg, close to the Hague. The equipment includes hangar accommodation for about 30 light aeroplanes, excellent repair shops and full night landing facilities. The aerodrome is only about 4½ miles from the Pynacker air route beacon, where the air routes from Amsterdam to Paris and London diverge.

An aerodrome is to be established at La Villiaze, in the Channel Islands, where a suitable site has been bought by the States of Guernsey authorities for £35,000.

Winter Airship Service to South America

The German airship *"Hindenburg"* has proved as reliable in service as the *"Graf Zeppelin,"* and has now crossed the Atlantic ocean about 26 times. The vessel has made 10 visits to Lakehurst, New Jersey, the terminus in the United States of the Zeppelin North Atlantic service, and also has flown to South America several times. On every trip the *"Hindenburg"* has carried a full load of passengers.

Until the resumption of the North Atlantic service next spring the two Zeppelins will maintain a weekly service between Frankfurt and South America.

Honouring Australian Air Pioneers

A striking memorial to Sir Charles Kingsford Smith and Mr. C. T. P. Ulm, two Australian air pioneers, is to be erected at the southern head of Sydney harbour. It will take the form of a huge copper terrestrial globe, surmounted by a replica of the *"Southern Cross,"* Kingsford Smith's famous monoplane.

Another method being adopted in Australia to keep fresh the memory of the country's air pioneers is that of naming important airports after them. For instance, Darwin airport has been renamed Ross Smith airport, and that at Mascot, Sydney, is to be known in future as the Kingsford Smith Aerodrome. Certain other Australian airports are to be renamed shortly.

New American Flying Boat

A large flying boat capable of carrying up to 36 passengers has been built by the Douglas Company, of America. It is 95 ft. in span and 70 ft. in length. The Wright "Cyclone," series "C," engine fitted in it enables it to attain a top speed of 185 m.p.h. It will have a crew of four, consisting of the pilot, assistant pilot, wireless operator, and stewardess.

The Cierva C.30 "Direct-control" Autogiro descending vertically. This machine has long rotor blades and can take off after only a short run along the ground. Photograph by courtesy of Cierva Autogiro Co. Ltd.

Imperial Airways Progress

The Annual Report of Imperial Airways shows a steady increase in the amount of traffic carried and the mileage flown. During the year ended 31st March 1936, the total number of passengers carried on the company's European services was 54,272, as compared with 48,642 during the previous 12 months. On the Empire routes the number was 8,505, an increase of 1,402 over that of the previous working year.

Four new services were started during the year. They were the London-Brindisi and London-Budapest services, and those linking up Khartum with Kano and Penang with Hong Kong. In October this year the Khartum-Kano line was further extended to Lagos, Nigeria.

The total number of the company's aircraft now in active service is 38, including the two new flying boats recently introduced on the Mediterranean section.

The huge Zeppelin shed at Friedrichshafen, in which the airship "Hindenburg" was built. Another Zeppelin, the LZ.130, is now under construction there. Photograph by J. M. S. Risk.

"Burnelli" Aeroplane to be made in Great Britain

A British version of the American "Burnelli" high wing monoplane is to be produced by the Scottish Aircraft and Engineering Co. Ltd., and the first machine will probably be completed in about five months' time.

The "Burnelli" is of all-metal construction, duralumin being chiefly used, and carries two pilots and 14 passengers. The machine differs from a normal aeroplane in having a very short fuselage, which is only large enough to contain the pilot's compartment, passenger cabin and a small baggage compartment. The fuselage is of aerofoil or wing section, thus contributing to the lift of the machine, and the curve of its underside is continued in specially-shaped booms which carry the tail unit. The two engines are carried in large nacelles that project from the front of the fuselage, a very unusual arrangement.

Test Flights Over North Atlantic

The Deutsche Luft Hansa recently completed a series of experimental flights across the North Atlantic, designed to provide data on which to work out a reliable trans-Atlantic air service between Germany and the United States. The flights have been carried out by two Dornier flying boats called *"Ze/hr"* and *"Aeolus"* respectively, with the assistance of the depot ship *"Schwabenland,"* which was withdrawn from the company's South Atlantic air route specially for the purpose.

On the westward experimental flights the flying boats were catapulted from the depot ship off Lisbon, and flew by way of the Azores and Bermuda. The *"Schwabenland"* had then to hasten across the Atlantic, and start the aircraft off on their return flights. The return trips were not made immediately, as the machines also carried out experimental coastal flights between New York and Nova Scotia. On one westward trip they omitted the call at Bermuda, and flew from the Azores direct to New York. The long return flight to the Azores was also accomplished non-stop.

New Internal Air Services

Air Dispatch, the air transport company operating the early morning newspaper service between London and Paris, are planning two new internal air services. One of them will link Croydon with Portsmouth, Bournemouth, and Torquay. The other service will be between Croydon and Aberdeen.

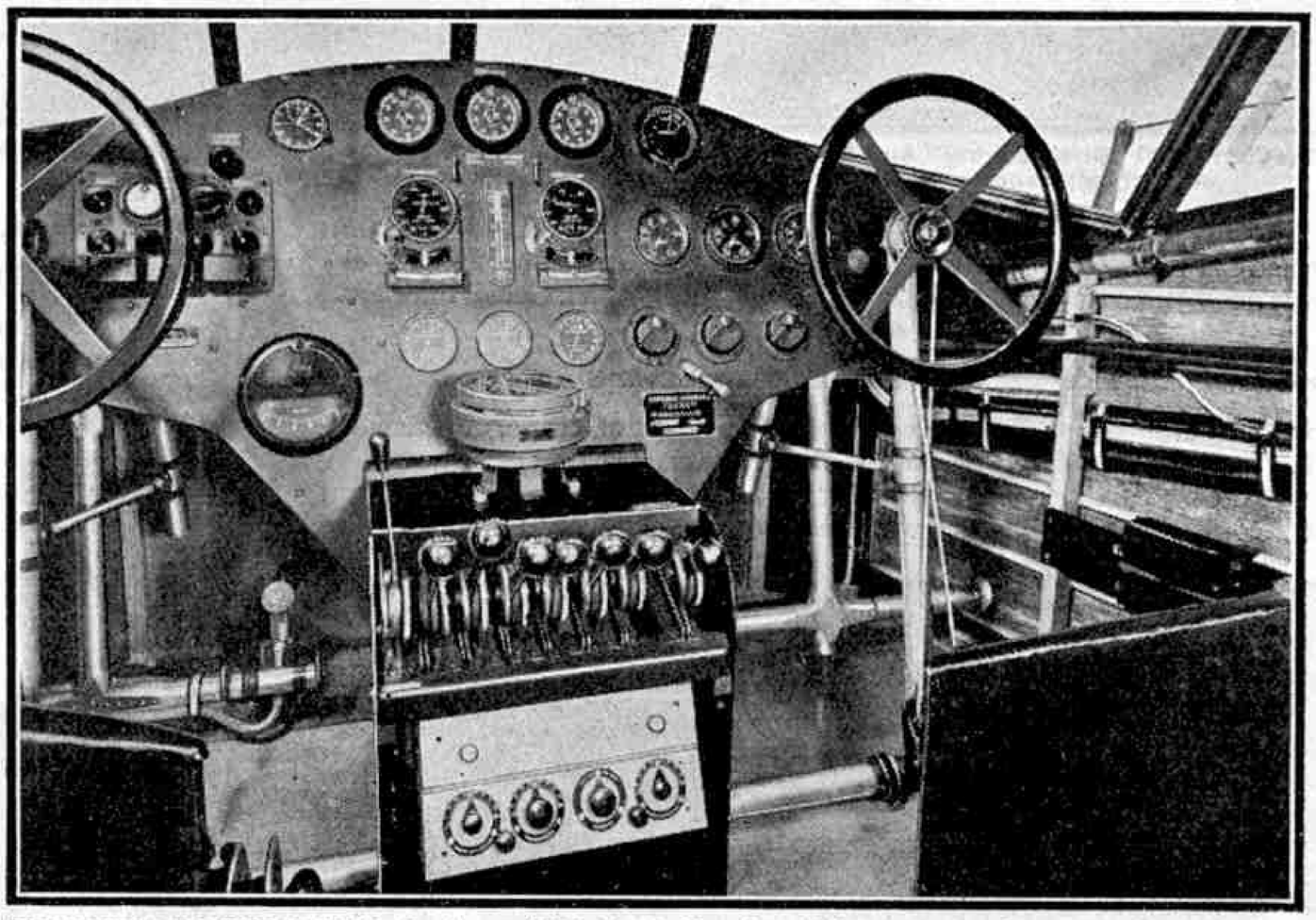
A Modern "*Flying Dutchman*"

Amsterdam to London by K.L.M.

By O. S. Nock, B.Sc., D.I.C.

AMSTERDAM, 5.45 p.m. From the steps of the K.L.M. office I watched the city workers going home, some on foot, some by tram, but the majority pedalling quietly along on bicycles. It seemed incredible that I was due at Croydon in less than three hours! But the splendid aeroplanes of the K.L.M. put a girdle across the sea faster by far than any phantom ship in the legends of the "*Flying Dutchman*," and in a time of 2 hrs. 5 min. from airport to airport manage to put in a ten-minute stop at Rotterdam as well.

A smart bus painted in the same colours as the company's aircraft, dark blue and light blue, left the Leidscheplein in the heart of the city at 5.55 p.m. The initials K.L.M., by the way, stand for Koninklijke Luchtvaart Maatschappij, for which the literal English translation is "Royal Air Traffic Company"; but the name that has been officially adopted throughout the world is the well-known one of Royal Dutch Air Lines. A run of some twenty minutes brought us to Schiphol Airport, about six miles to the south of Amsterdam. The setting is as perfect a Dutch landscape as could be imagined. The country is dead flat in every direction, and well below sea level; a big canal runs north and south between high banks; a little to the north is a picturesque group of red-tiled cottages, and behind them a windmill with sails whirling round in the stiff wind.



The cockpit of a Fokker F.XII, the type of K.L.M. air liner in which the author flew from Amsterdam to London. Photographs by courtesy of Royal Dutch Air Lines.

The airport building is a characteristic piece of modern Dutch architecture. In all recent buildings, even the humblest dwellings, the windows are huge, and at Schiphol the spacious room that faces the aerodrome and combines the functions of restaurant and waiting room is glazed almost from floor to ceiling. Passengers are kept informed by loudspeaker of the times of arrival of aircraft and in every case the information is repeated in several languages. The machine by which I was going to travel provides one link in the "Rome Air Rapide" service. Rome is left at 10.25 a.m., Milan at 1.5 p.m., though of course the 24-hour clock is in use on the Continent and the time is thus 13.05. Calls are made at Frankfort and Cologne and the aeroplane is due at Schiphol at 18.15. But on our arrival by bus there was no sign of the German machine, and in a few minutes the loud speakers told us she was 40 minutes late. That meant that we should not get away until about 19.15, that is 7.15 p.m.

The time passed quickly. Over in the shed on the south side of the aerodrome were two of the mightiest K.L.M. machines. One was the Fokker F.36 4-engined monoplane, flagship of the company; this carries 32 passengers and has a cruising speed of 163 m.p.h. The other was one of the famous Fokker-Douglas D.C.2 machines that are used on the Far Eastern service from Amsterdam to Batavia and all over Europe; it was one of these twin-engined monoplanes that put up such a magnificent performance in the England-Australia race in 1934. Their cruising speed is no less than 190 m.p.h.! Our machine was the "*Ysvogel*," a handsome Fokker F.12 three-engined monoplane. This type carries 14 passengers and has a cruising speed of 125 m.p.h. The name Ysvogel means, literally, a bird from the river Y, on which Amsterdam is situated; it is what we know in England as a Kingfisher.

Soon after our arrival an aeroplane operating a Dutch internal air service arrived; this was a handsome 3-engined Fokker of class F.20 named "*Zilvermeeuw*." This was quite similar in appearance to the "*Ysvogel*," but a rather faster machine. All these Fokker types have a strong family likeness having the wings above the fuselage; in this way they differ from the Fokker-Douglas machines which have the wings below the fuselage and engines, the former being curved very slightly upward towards their extremities.

Our delayed start was in some ways most fortunate, for about 7 o'clock—or still being on the Continent I should say 19.00 hours—there developed the most astonishing atmospheric phenomena I have ever witnessed. A violent thunderstorm came up from the North Sea; the western sky darkened to the colour of indigo, and then, as the disturbance neared the coast, it divided and the main storm passed northward towards the Zuider Zee. But it was the smaller detached portion that produced so sensational an effect. The clouds, black as night, slowly clustered in the form of a "mackerel sky"; but the scales, instead of being soft white on a blue ground, were black showing patches of ominous yellow between. The wind then blew each of these black masses out like the sails of a ship and the lower ones drooped until they seemed to touch the horizon.

When the sky was at its strangest a roar overhead announced the approach of a big aeroplane. It was not the connection from Germany we were awaiting, but a beautiful Belgian monoplane from Brussels; its silver-white paint and the gay colours of the Sabena company's flag stood out with startling effect against the dark sky. This machine had scarcely landed when the great Junkers monoplane that we were expecting flew overhead, bringing with it some passengers from Milan to London. It bore the name "*Paul Billick*," was painted in the distinctive grey and black livery of the Deutsche Lufthansa, and carried of course a huge swastika on the tail. Seen together, the three machines, Belgian, Dutch, and German, made a striking group.

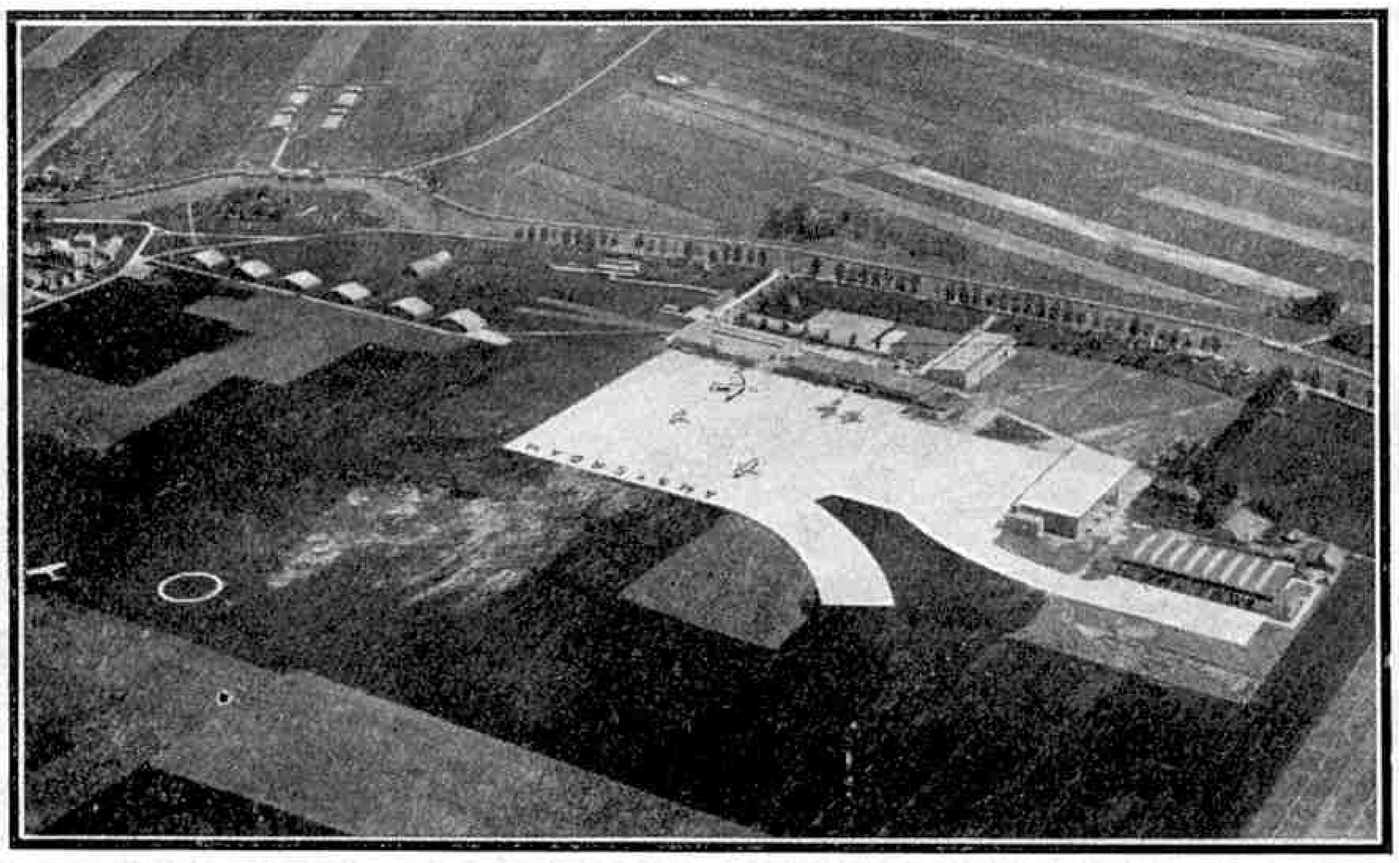
Then a noticeably Dutch voice on the loudspeaker—"The aeroplane for London will leave in a few minutes." Baggage and mails had been loaded, we took our seats, and at exactly 7.15 p.m. the "*Ysvogel*" took off. My seat was right forward on the port side and almost abreast of the port engine; in this type the wings are above the fuselage so that there is a clear view below past the engine. The landing space at Schiphol is very extensive, and after taxi-ing into position we took off in almost a direct line for Rotterdam. Due no doubt to the air currents caused by the thunderstorm, the going was a bit bumpy at first, and the rain rattled like hail on the windows; but flying quite low we were soon right out of the storm.

The Dutch countryside is fascinating enough when viewed from a canal boat or a train, but it is not until seen from above that its full wonder is revealed. Then the amazing network of canals and dykes is spread out like a map. From the sea run great waterways along which ocean-going ships can pass; their level is much above that of the surrounding country and their course is preserved by massive embankments. From these main arteries there branch off the smaller canals; these are lowered by locks to ground level and it is along their banks that numerous busy little towns are built. The land between these smaller canals is drained by an intricate network of dykes, which incidentally take the place of hedges in dividing field from field.

We were soon flying over Amstelveen. This little town seems literally surrounded by water; the red roofs and tall church tower

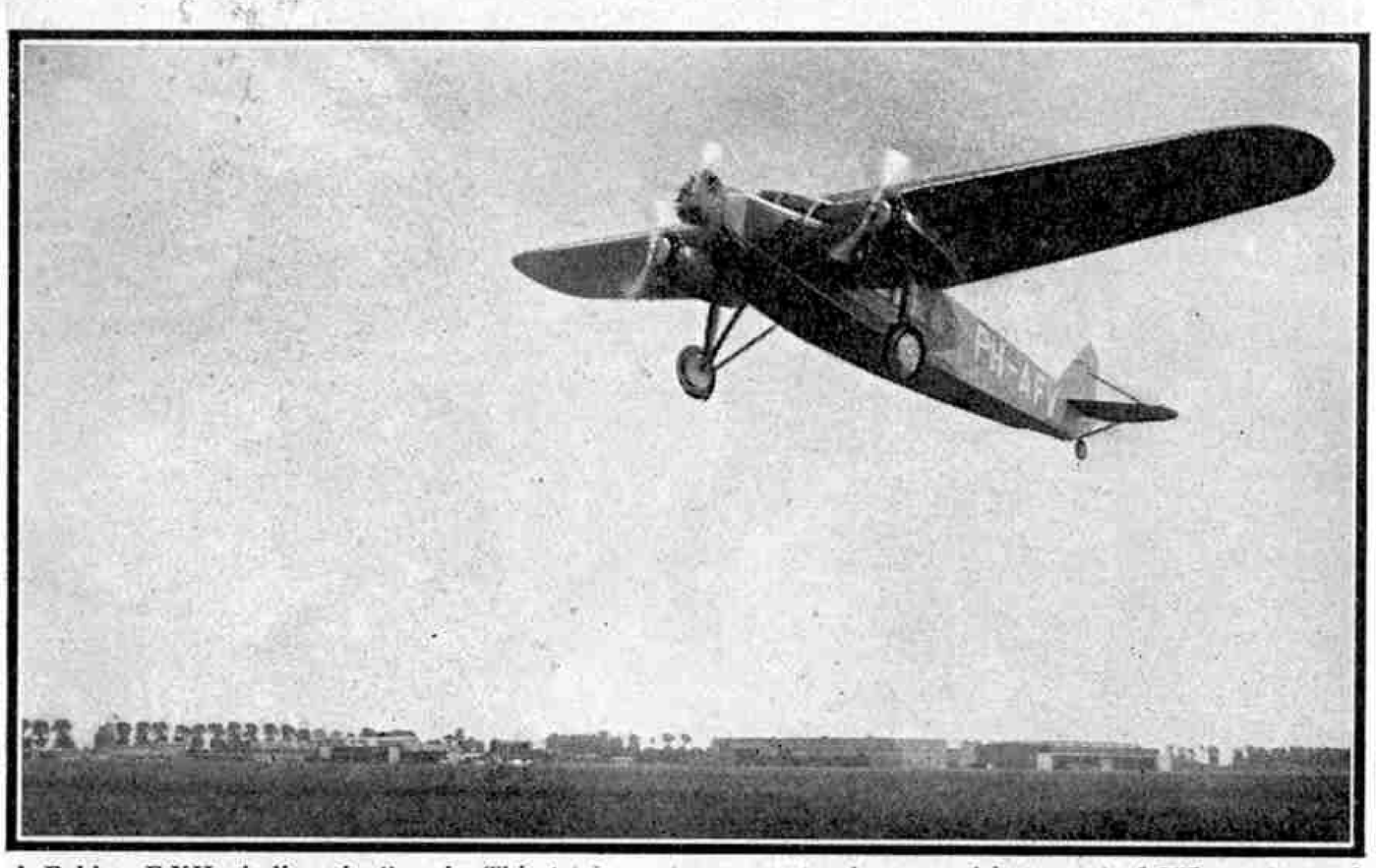
looked very beautiful against the limpid blue of the canals, and just to the south were what seemed like extensive watercress beds. We crossed the railway from Leiden to Utrecht, which is lined on both sides with big dykes, and just beyond, an isolated windmill made, as always, a charming picture. Then for a while we were flying near a wide arterial road. A big programme of road building is in progress just now in Holland, and in all this new work a separate track is being provided for bicycles. Cycling is immensely popular, and by this means a much safer and more enjoyable run is ensured, and at the same time the main highway is left clear for fast traffic.

The rain had ceased some little time ago, the sky was clearer, and right ahead of us the horizon was bounded by a deepish blue haze of great beauty. The dyke-drained fields gave place for a while to slightly higher ground that was covered with a patchwork of yellow and purple squares, the latter dotted with numerous darkish objects that I later discovered to be small ricks very similar to those seen in the Scottish highlands. Alongside a big canal were seven dismantled windmills all in a row. Much to the regret to all lovers of beauty a great number of these fine old mills all over Holland are suffering the same fate, and vigorous steps are having to be taken to ensure that some of the finest examples are preserved. It would be a tragedy indeed if these beautiful windmills, which are such a characteristic feature of the Dutch landscape, were allowed to ruin now that so many of them have been rendered obsolete by the coming of more modern machinery. We crossed the railway from The Hague to Gouda along which a streamlined Diesel-electric train was speeding; over Moerkapelle, where there are acres of glass-houses, and then the fair view was obscured in a storm of rain.



Aerial view of Schiphol Airport, Amsterdam, one of the most important airports in Europe.

Out of the mist loomed Rotterdam; whole suburbs of attractive-looking flats on the outskirts, a delectable park, and ahead, through the smoky haze that hung over the city, the several channels of the river Maas appeared as winding ribbons of silver. Still flying dead straight we got a bird's-eye view of the Central station, where a westbound electric train was just leaving for The Hague; and so out over the river for a really superb view of the port of Rotterdam. From above, the dock area looks like one vast lake intersected only by numerous slender jetties and wharfs; ships were everywhere, and a little way up the river was the big three-funnelled Holland-America liner *"Statendam."*



A Fokker F.XII air liner in the air. This triple-engined machine has a cruising speed of 125 m.p.h., and carries 14 passengers.

Rotterdam airport is on the island of Ysselmonde just across the river from the city. It is a vast open plot by the waterside. Brightly coloured barges were moored along the banks near by; we circled round banking steeply, passing over a gaily painted windmill, and made a smooth landing at exactly 7.40 p.m. It is a little under 40 miles from Amsterdam, so that our average speed, including climbing and the descent, was nearly 100 m.p.h. over this short distance. We should have travelled even faster but for a stiff wind off the sea. No time was wasted over the stop and in five minutes we were off again—next stop Croydon.

Rotterdam lies on the northern shore of that extraordinary delta by which the Rhine and the Maas enter the sea. There are a dozen large islands, on one of which is the airport, and many smaller ones, all as flat as the proverbial pancake. As we headed for England the evening sun was just breaking through, and the islands, misty grey shapes outlined by silvery threads of water, were flecked with patches lighted by the sun. In one place a group of red roofed houses would stand out brilliantly; farther away a line of sand dunes shone pale gold. We were flying much higher now, nearly 4,500 ft., and well beneath us a few light clouds went racing by, momentarily veiling the scene below. The wind was directly head-on, and blowing at a steady strength of 30 m.p.h. reduced our land speed to 95 m.p.h.

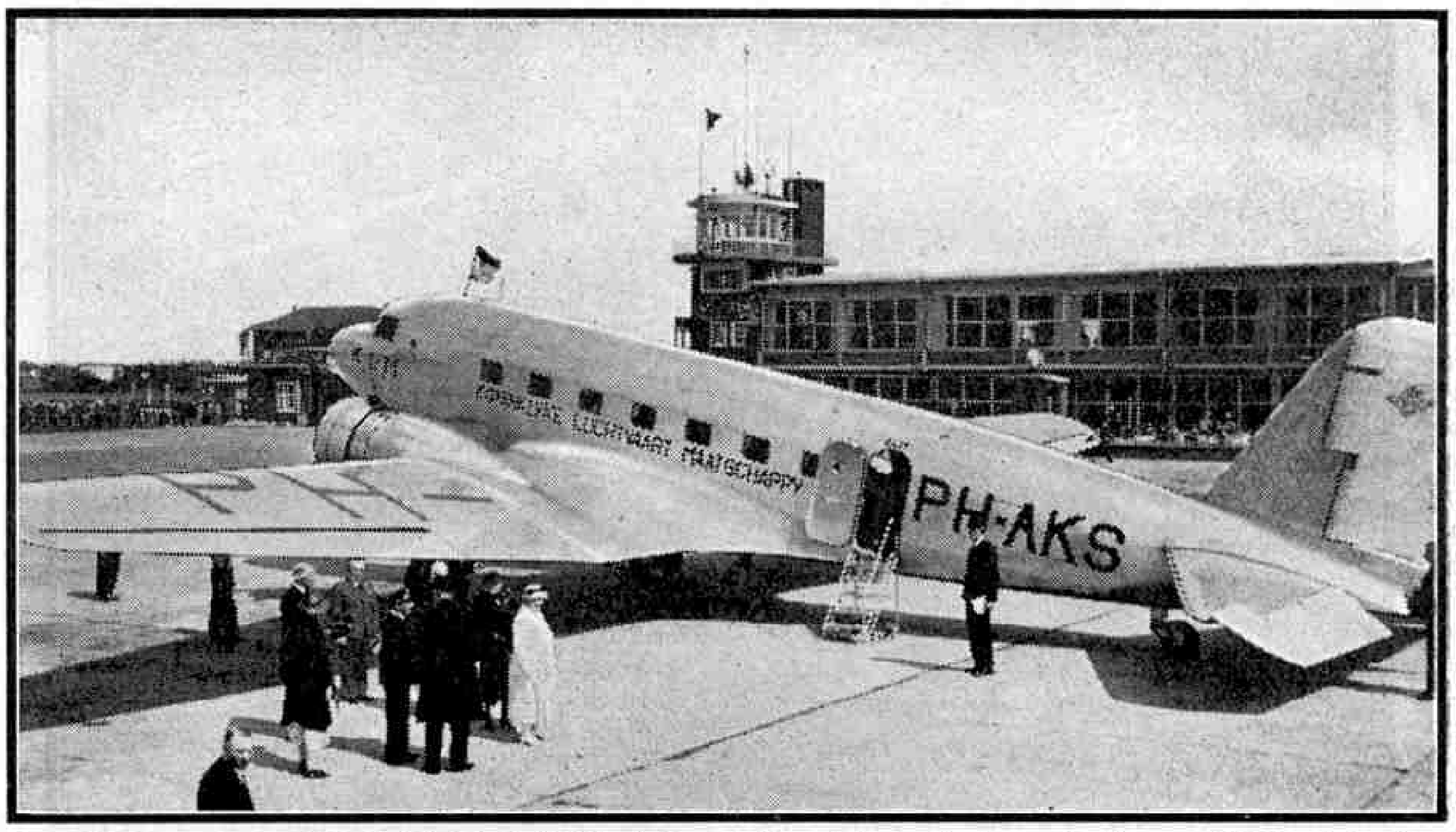
Soon after leaving Rotterdam we crossed the Old Maas river, then we passed over Voorne, and so approached the island of Over Flakke. Across the estuary known as the Brouwershaven Gat lay the island of Schoewen, a veritable patchwork quilt of brown and yellow looking fields. We flew right along the southern shore of Over Flakke, and even from this height the town of Stellendam stood out in very clear detail; a little farther westward the land lying below sea level was protected by a stout embankment. Sickle-shaped mudbanks stretched across the estuary, and the farther shore of Schoewen was lost in the haze of the setting sun.

We were travelling with hardly a tremor. From where I sat I could see through into the cockpit, and there the navigating officer, earphones to his head, was constantly consulting charts, making calculations, and always scanning the route ahead. Once he came through to see that we were all comfortable and to check the temperature of the cabin. From where I sat the pilot was hidden from view. Most of the passengers were either reading or asleep; the atmosphere was cosy in the extreme, and looking out at times it seemed as though we were scarcely moving.

Just after eight o'clock we passed over the western end of Over Flakke. To the south, the coast of Schoewen was one long line of sand dunes. We were too high to see much detail; fields glowed in the sunshine, a few clouds scudding beneath us were tinged with pink, and there was only the vaguest hint of another estuary to the south of the island. Although we were doing a good steady 95 m.p.h. we seemed merely to be drifting slowly out over the sea. The sky overhead was calm and beautiful—an astonishing contrast to the fury of the storm that had swept over Amsterdam only an hour before—and at 8.15 p.m. the sand dunes of Schoewen, our last glimpse of Holland, blended into the haze of evening.

But about five minutes later I sighted land again far to the south; this was the island of Walcheren, the southern extremity of the Maas delta. It was only a dim grey line and was soon lost to view. The sky was overcast again, though very calm; visibility was not more than about four or five miles, and in the pervading greyness the sense of motion vanished almost entirely. Somewhere ahead in the misty haze lay England. I had not plotted the course beforehand and I fell to wondering where we should first strike land. There was hardly a stir in the sea below; not a sign of a ship—and this one of the busiest waterways in the world! For half an hour we flew with scarcely a movement from the plane. Only the clouds altered their form.

At 8.50 p.m. there were definite signs of a change. Long balloon-like clouds came floating along level with us, there were one or two very slight tremors—nothing approaching a bump—and then quite suddenly the clouds swept beneath us; they were light vapoury things, frequently parted to show the sea below, but for a few moments it was quite eerie. Then as we shot clear, there ahead was a tiny point of light. In all my travels I never remember being quite so thrilled as by this, the first sight of England again, and there was real excitement in trying to spot where we were. Our approach was tantalisingly slow; the clouds raced across once more and hid the view and for a few minutes it was raining in torrents. But when the sky cleared we were near enough to see the shape of the coast; the land ran out to a blunt nosed point, and curved away southward in a sweeping bay. My first guess was right; we were heading straight for the North Foreland, and the light I had seen was Ramsgate.



One of the Douglas D.C.2s of K.L.M. at Schiphol airport. The photograph shows the Queen of Holland greeting Prince and Princess Axel of Denmark.

In a few minutes we could pick out the twinkling lights of the harbour. The light that I had first seen and taken to be a lighthouse is a powerful beacon for aircraft, placed high on the cliffs. At 9.13 p.m. we passed over the coast. It was still daylight, but Ramsgate was brilliantly illuminated with fairy lights; just inland a glowing light in the Southern Railway station revealed a locomotive being got ready for the road. Away to the south the coast could be seen stretching towards Sandwich and Deal; from still farther afield came the flashes of lighthouses and lightships, on the Goodwin Sands, along the coast, and, most powerful of all, the tremendous aerial beacon at Lympne.

From the island of Over Flakke, where we crossed the Dutch coast, to passing over Ramsgate, we had averaged 96 m.p.h. The wind, although not boisterous, was consistently steady and strong and had slowed us down very considerably—indeed it was already clear that we should not keep time. The booked speed is a little over 105 m.p.h., so that this type of machine would have a good margin of power in reserve on a quiet day; it was no doubt the rough weather prevailing all over Europe that had made the connecting plane so late in arrival at Amsterdam.

A striking photograph of Rotterdam as seen from the air. The fine buildings in the centre and foreground are the Town Hall and the General Post Office.

In the waning light the English countryside looked extraordinarily beautiful; green park lands, a winding river, miles of dark luxuriant woods made a great contrast to the last glimpses of Holland. Now Canterbury lay to the south; we were flying lower now, and among the twinkling lights there were just enough daylight to pick out the towers of the Cathedral. We were over the coast again near Whitstable, where a roundabout at a road crossing showed up very plainly. We overtook an express train heading for London; the fire door of the engine was open and from above it looked like a huge bonfire moving along. Everywhere one looked seemed an intense green, rendered more vivid still in the approaching darkness. The cabin of the "*Ysvogel*," now that the lights were put on, was cosier than ever. The outside world seemed completely shut out as we sailed smoothly and majestically among the clouds.

But through the windows the passing scene below became more fascinating than ever. It was getting really dark now. We passed over Faversham at about 3,000 ft., travelling at 98 m.p.h. Dotted all over the countryside were the lights of cars; the ridge of the North Downs showed darker than the rest of the landscape, and beyond these heights was Maidstone. Looking eastward the scene was simply entrancing. The fields below were that vivid dark green of nightfall; in the distance they blended with the blue of the sky, where the rising moon shone amid a huge bank of white cumulus cloud. From far out in the blue came the imperious stabs of yellow light from Lympne beacon.

Once across the Medway it grew too dark for landmarks to be recognised. We passed over a big main road on which the headlamps of cars returning from the coast formed an endless chain of lights as far as the eye could see; there were flashing lights away to the south-west that probably came from Gatwick airport, and all the time we were gradually coming down to a lesser altitude. We crossed the valley of the Darent, recognisable by its roads and railways, at about 1,500 ft., and now right ahead of us was the red beacon of Croydon Airport.

A few minutes more and we were nearly overhead. Lights were everywhere; buses, trams, and even bicycles could be distinguished clearly. Threading its way through all was a chain of brilliant arc lights along the Brighton road, and now right below was the landing ground, its extent marked by a ring of small red beacons. We circled right round, all the time gently descending, but after turning once the control tower flashed a series of red danger signals to us; another machine had just landed and was not quite clear. The engines were put on again, we rose ever so slightly and circled right round again, and this time the control flashed green. Powerful headlights at the end of each wing were put on, we skimmed over the buildings, and came down so gently that the exact moment we touched the earth was really difficult to judge. Floodlighting the front of the control tower with our headlamps we coasted smoothly in and came to rest a few minutes before 10 o'clock.

The Control building clock showed only 9.40 p.m. During the flight I had completely forgotten that Amsterdam time is twenty minutes in advance of that of Greenwich. Although our actual flying time from Rotterdam to Croydon was 2 hrs. 13 min. we had been travelling westward with the sun, and by the clocks at each end had taken only 1 hr. 53 min.

The scene on arrival at Croydon was a fitting climax to this enthralling journey. A big Imperial Airways liner, one of the "Hannibal" class, had just arrived and shone like silver in the beam of our headlights. In the darkness ahead was a huge Junkers monoplane, while the red flashes of the tall beacon, the cheery shouts of the ground staff, and the brilliance of the moonlight night left an extraordinarily vivid impression of journey's end.

Puzzles

Puzzle No. 1

In each of the 10 vertical columns in Fig. 1 place words of four letters, leaving blank the middle horizontal row numbered 11. Clues to the 10 words are given below.

When this has been done, the name of an English city is to be written in the row numbered 11, and if the puzzle has been solved correctly, all the four-letter words in the vertical columns will then become words of five letters. The clues are as follows: 1. Trimming braid; 2. Part of the face; 3. Mud; 4. Used on roofs; 5. Farm buildings; 6. Fish; 7. Seed; 8. One who employs; 9. Set rotating; 10. Colour.

1	2	3	4	5	6	7	8	9	10
11									

Fig. 1.

Puzzle No. 2

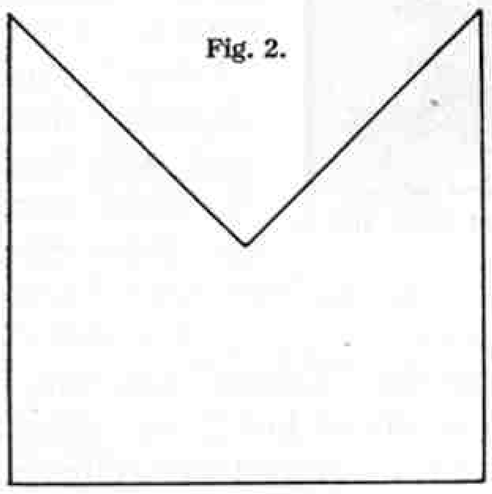
In the brackets in each of the following lines insert the names of well-known towns in the British Isles, so as to make the sentences complete.

1. "Can you tell me where this road ( )?" the motorist asked the yokel.
2. "I will send in your ( ) you like," said the maid to the caller.
3. I have im( ) him its importance.
4. Nobody seems to like my cake, for there's ( ).
5. The Duke has just built a ( ) near here.
6. There was a ( ) where he had been standing in his muddy, wet boots.
7. Out ( ) is cultivated than in this country.
8. The seaman commenced to ( ) the seams of the boat.
9. He rang the ( ) and loud, but the ( ) from the ( ) could still be heard.
10. "Do you ( )," enquired a customer of the wine merchant.

Puzzle No. 3

A boy was given a piece of paper shaped somewhat like a Bishop's mitre as shown in Fig. 2, and was asked to cut it into four parts, each of these to be of similar shape. After a few experiments the boy managed the task successfully. Take a piece of paper and try this puzzle yourself.

Fig. 2.



Puzzle No. 4

Starting at the letter M in the top left-hand corner of the alphabetical maze shown in Fig. 7, the reader is invited to trace his way through the maze until he reaches the tail of the "S." This should be done in less than one minute.

Puzzle No. 5

The letters ABCD, in that order, represent the year in which a King of England was born, each letter standing for a figure.

A and B together equal the total of C and D; A and C together equal B; A and D together are half C; C is three times the value of D.

What is the name of the King referred to?

Puzzle No. 6

A pilot boarded a ship in a river. As he climbed the ladder up the ship's side he noticed that three rungs of the ladder were under water. He stayed aboard for three hours, during which time the tide rose at the rate of 1 ft. per hour. The rungs of the ladder were 9 in. apart. How many rungs were under water when he left the ship?

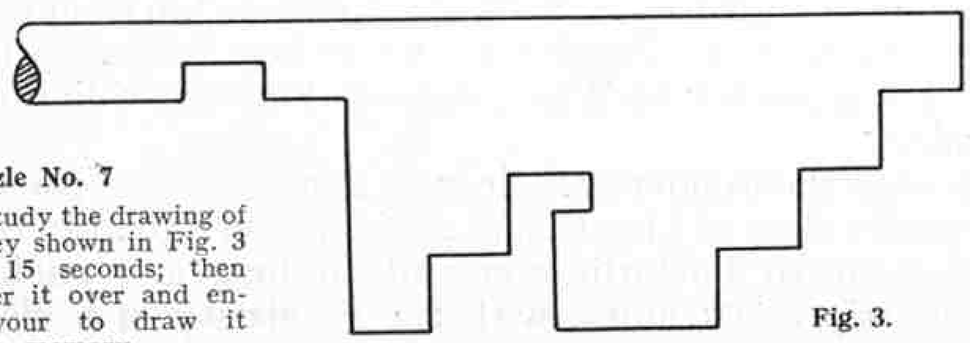


Fig. 3.

Puzzle No. 7

Study the drawing of a key shown in Fig. 3 for 15 seconds; then cover it over and endeavour to draw it from memory.

Puzzle No. 8

How many triangles are there in Fig. 4?

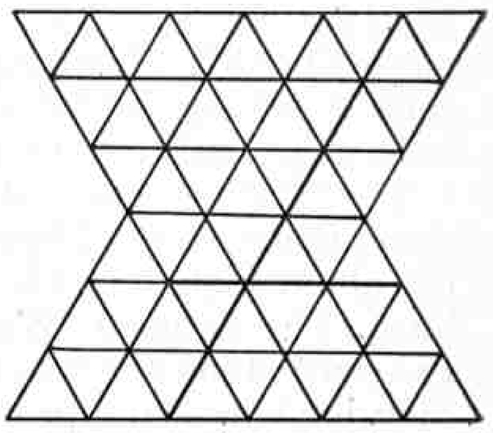


Fig. 4.

Puzzle No. 9

A letter addressed as shown below was received at a certain Post Office:

WARNER
30 TON ST.
5

ASH2OCWTS.

After a study of the envelope, however, a smart postman was able to solve the mystery. What was his solution?

Puzzle No. 10

A boy is left alone in the house. He has only one match, and he wants to light his bicycle lamp, the gas stove and the fire. Which would a discriminating boy light first?

Puzzle No. 11

A man bought a piece of linoleum 6 ft. × 3 ft., which he required to cover a floor 9 ft. × 2 ft. To do this he cut the linoleum in to two pieces that together exactly covered the floor. What was the size and shape of each piece?

Puzzle No. 12

A tall Indian and a little Indian were walking down a road. The small one was the son of the tall one. What relation was the tall Indian to the small Indian?

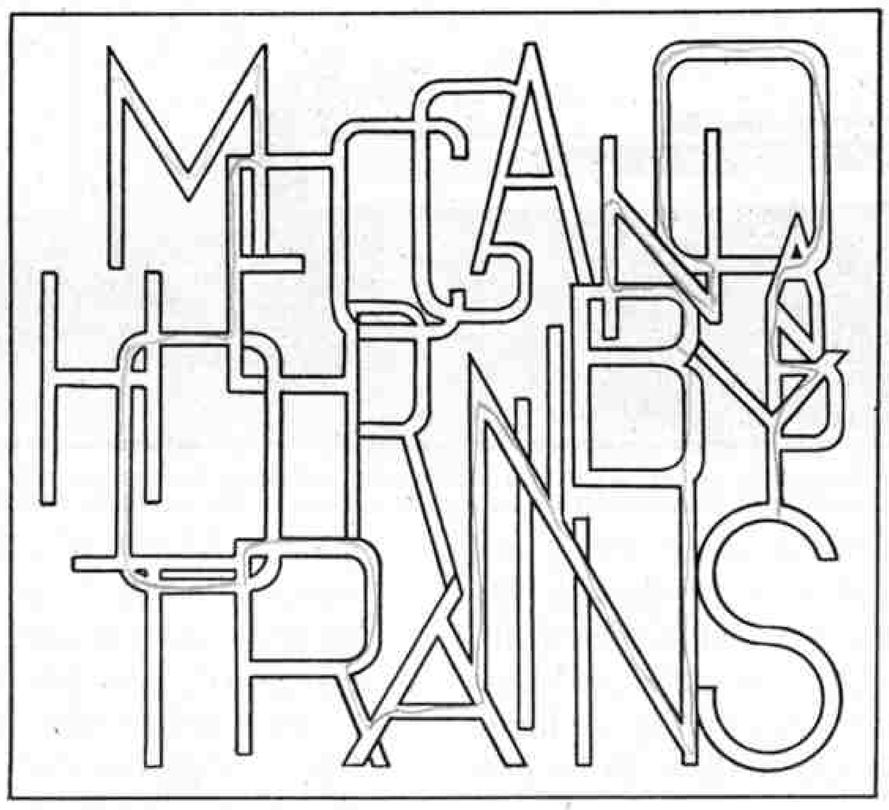


Fig. 7.

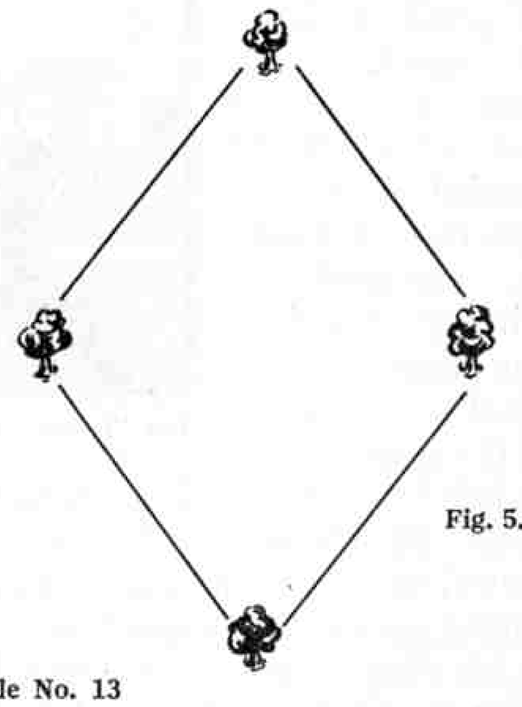


Fig. 5.

Puzzle No. 13

A landowner had four trees, planted one at each corner of a diamond-shaped field, as shown in Fig. 5. He bought five more similar trees and planted these in such a way that the nine trees made ten rows, each containing three trees. In what positions did he plant the new trees?

Puzzle No. 14

During manœuvres a message in code was sent by the Admiral to test the ability of the midshipmen. Here is the message:

"THIS LOT GIVE A DIM SYNOPSIS USEFUL TO NEW RANGE FINDER."

The midshipmen deciphered it with ease. Can you?

Puzzle No. 15

A man was asked "How old is your brother?"

"Two-thirds of his age," was the answer, "is just five-twelfths of mine; and I am nine years older than him."

What was the age of each?

Puzzle No. 16

Fig. 6 shows a farmhouse surrounded by eight fields, in each of which four men are at work, making a total of 32 men. The house has four windows, one in each side, so that when the farmer looks out of any of the windows he can see 12 men at work. One day an additional labourer is given a job, making a total of 33 employees. The farmer then re-arranges them in the fields so that he can still see 12 men only through each window. What was the new arrangement?

Supposing the farm work increases, and it becomes necessary to take on additional labour, how many more men could the farmer employ without disturbing his curious requirement?

4	4	4
4		4
4	4	4

Fig. 6.

The Story of the Steamship "*Edina*"

A Wonderful Veteran of the Seas

By A. R. Prince

THE vessel illustrated on this page is the "*Edina*," which was launched from the yard of Barclay, Curle and Co. Ltd., Glasgow, on 5th May, 1854. The "*Edina*" is still in service in Australian waters, although she has passed her 82nd birthday, and is believed to be the oldest ship in service in the southern hemisphere. Her record indeed has only been surpassed by two vessels.

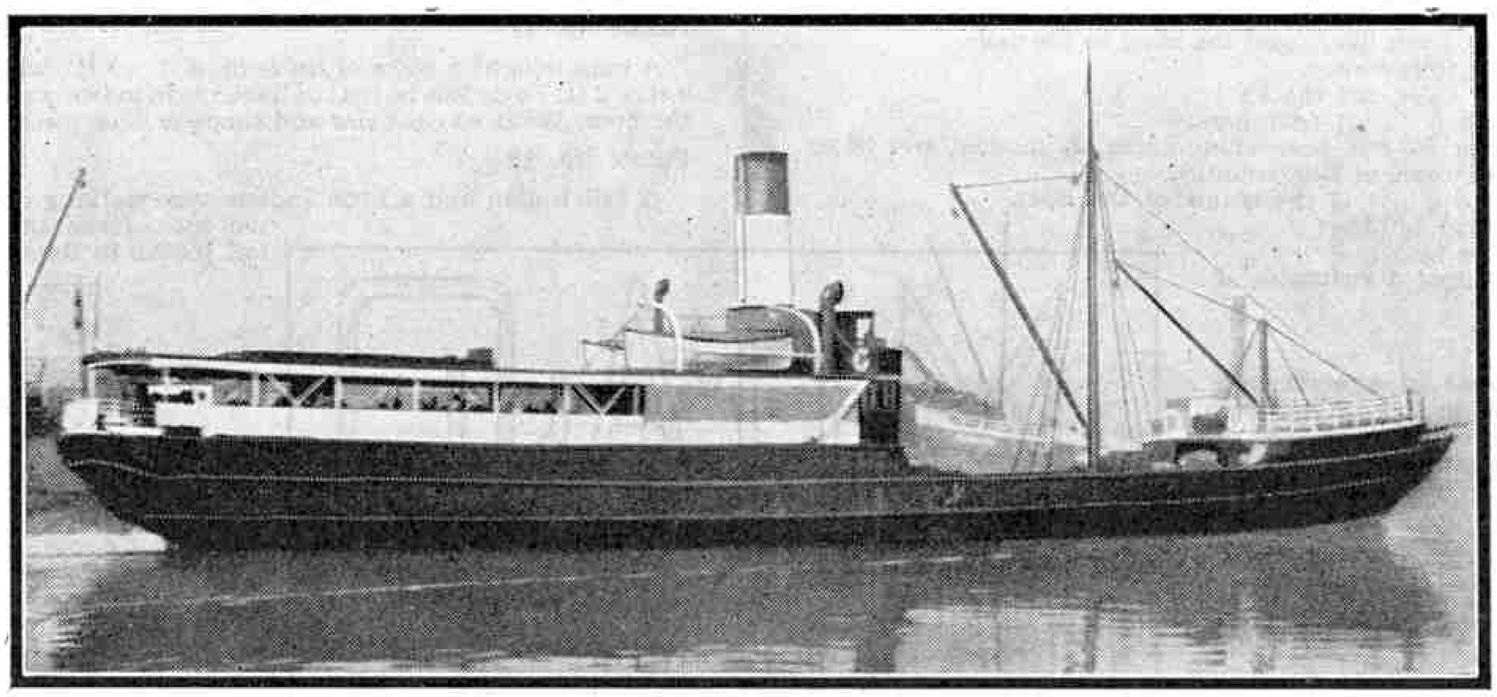
The "*Edina*" has had an adventurous life. On her first commission in the British Mercantile Marine she traded for about eight months between Leith, Hull and Hamburg. The Crimean War had then broken out, and in February 1855 she was requisitioned for transport duty, carrying horses and provisions to the Black Sea. Later her passenger accommodation was enlarged and she was able to convey 40 officers and some nurses to the Crimea. It is reported that on her last trip in this service she rammed and sank a Russian vessel.

For five years after reverting to peaceful occupations the "*Edina*" was engaged in ordinary trading; then came her removal to Australian waters. She left Leith for Melbourne on 23rd November, 1862, and arrived in Hobson's Bay on 7th March, 1863, having taken 104 days for the trip, which was made entirely under canvas. The vessel then had three masts, and was square rigged on the foremast. She was really a large steam yacht in build, and her fine yacht-like lines can still be distinguished.

Soon after her arrival at Melbourne, gold was discovered in Otago, New Zealand, and she was diverted to carry miners and prospectors eager to share in the rush. She made exceptionally quick passages that earned her a great reputation. Her average time from Melbourne to the Bluff, in the South Island of New Zealand, was 5½ to 6 days, and on one trip she carried 350 passengers, later returning with 60 passengers and 20,000 oz. of gold.

When the Otago gold rush subsided, and the New Zealand trade began to wane, the "*Edina*" returned to the service between Melbourne and western district ports, and in this she continued until 1873. Then she was bought by Howard Smith and Sons, now the Australian Steamships Pty. Ltd., and was sent to Queensland after an extensive overhaul. She traded on that coast until 1879, when she returned to Melbourne and was placed out of commission for 12 months. During this period she was greatly altered to suit the Geelong trade, into which she was about to enter. Her hull and rig underwent extensive changes, a poop was built at the stern and two masts were removed, so that when she made her first trip across Port Philip Bay to Geelong she was almost a new vessel in appearance.

Later her owners decided to install new engines and boilers, and again the vessel underwent a transformation, for her hull was completely gutted, and she emerged from her temporary retirement with two masts. For a time she traded on the Queensland coast, and was brought back to compete with the "*Courier*," a new vessel entering the Geelong trade, and the two were keen and worthy rivals for many years. Soon after the "*Edina*" re-entered the Geelong trade, Captain Forbes was placed in command. This was the beginning of a long association between master and ship, for Forbes remained in command for 40 years, being relieved in 1922 by Captain Moxey.



The "Edina" leaving Melbourne on her daily run to Geelong and back. This vessel was launched in 1854, and is believed to be the oldest ship in regular service in the southern hemisphere.

The old ship's career in service in Port Philip Bay has not been without excitement. She collided with the "*Manawatu*" in 1898, and the latter vessel was sunk, but the "*Edina*" was only slightly damaged and was beached. No lives were lost in this disaster. Nearly 15 months later she crashed into the "*Excelsior*," one of her rivals, during a heavy fog. The "*Excelsior*" sank in deep water, and this time the "*Edina*" also was badly damaged, but her fiddle bow saved her from sinking.

Just before the Great War the veteran was relieved by a fine new passenger steamer, the "*Mourilyan*," and was laid up. Her days were by no means over, however, in spite of her age and long service, and in 1917 she was brought out and completely overhauled, with the result that she looked like a new steamer. She seemed to bear a charmed life, for in 1928 she escaped with little damage when again concerned in a serious collision in which she sank a steam tug.

In spite of her many overhauls and alterations, the "*Edina's*" external measurements have never been altered since the day she was built, but she has had three pairs of boilers and two sets of engines, and still speeds along at 10 knots. The figurehead that once adorned her prow was a fine example of handicraft. Unfortunately she lost it soon after her gold rush days, for it was splintered to fragments when the steamer "*Dandenong*" drove into her bows while she lay at anchor at Warrnambool, Victoria, riding out a gale.

To-day the wonderful little craft still occupies a place in the active class at Lloyds, and performs her daily run from Melbourne to Portarlington and Geelong and back, a round trip of 80 miles, with the regularity of a clock.

Berthing Ships on Dry Land

How Trawlers are Hauled Ashore for Repairs

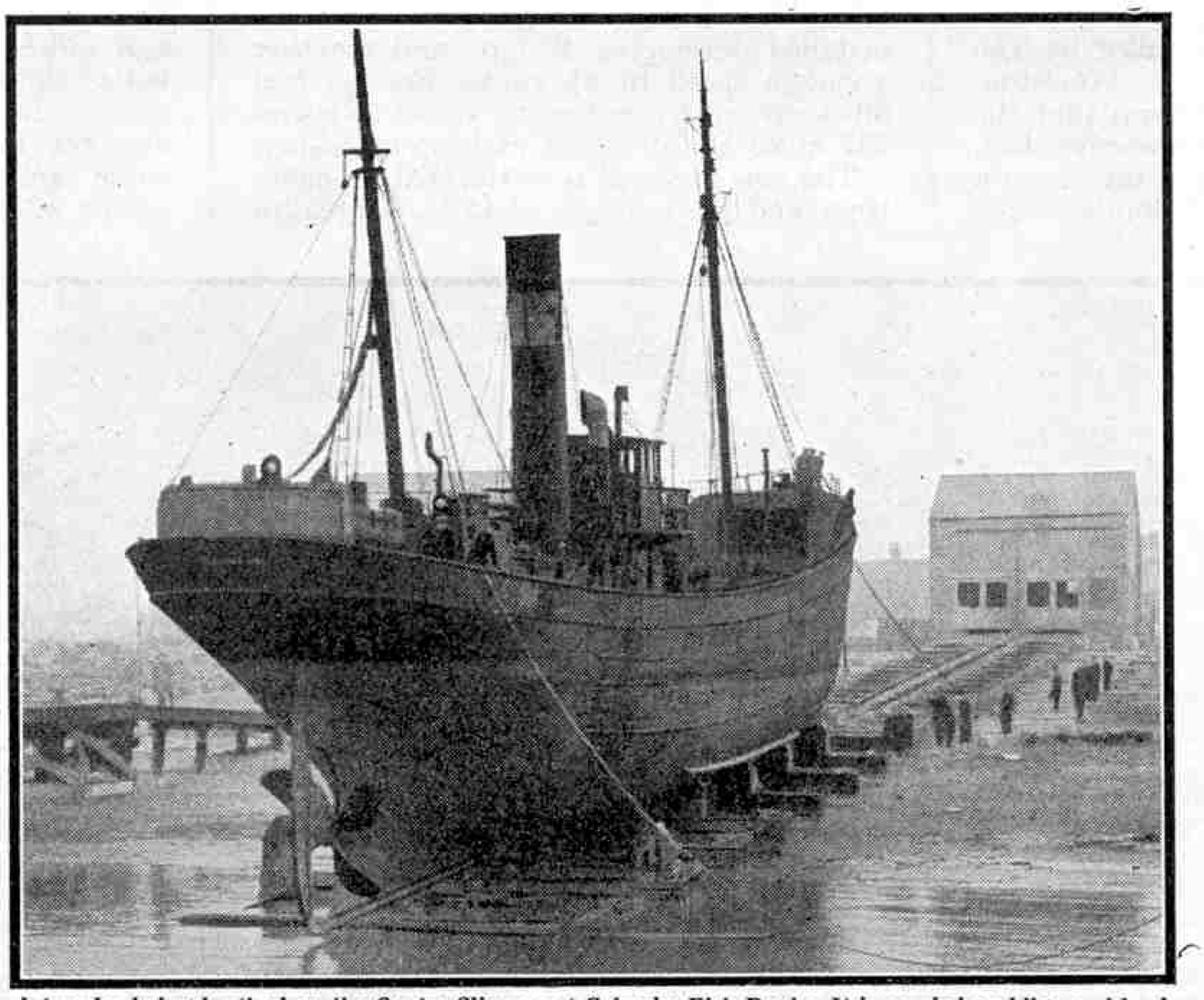
AT various periods throughout its career every ship undergoes inspection to ensure that its hull is in good condition. In the case of a large ocean liner or cargo vessel the inspection is carried out in a dry dock into which the vessel is towed by tugs. The dock gate is then closed and the water in the dock is pumped out. As the water is removed the vessel gradually settles on a row of keel-blocks laid along the floor of the dock, and is held upright by means of stout timbers or "shores" placed between the sides of the hull and the dock walls. When all the water has been pumped out from the dock a thorough inspection of the hull can be made and any necessary repairs carried out.

As it is a very expensive operation to operate a dry dock, small vessels such as fishing trawlers and coasting steamers requiring inspection or repairs are frequently simply drawn up out of the water on to slipways. In special cases each slipway is provided with side-slipping or traversing arrangements, by means of which vessels can be accommodated in berths on each side of the main slipway. Berthing ships in this manner is quite simple. The main slipway rails are laid on a gradient of about 1 in 12, and are carried on a timber way-beam that is supported partly on piles and partly on concrete foundations. The vessel is first floated over a cradle that is run down the slipway until it is submerged. The cradle consists of eight carriages on wheels. The vessel is blocked up on it in the usual manner, and it is hauled up the slipway by means of a winch until its wheels rest on the traverser, which also consists of a number of wheeled carriages. The cradle is then locked to the traverser, the haulage ropes are disconnected, and cradle and ship are pulled to one of the side berths.

The vessel is then transferred from the cradle to berth blocks laid on the ground. This is done by wedging up the berth blocks and easing off the cradle blocks until the vessel is supported entirely by the former. The cradle and traverser are removed and are then available for dealing with another vessel. A clear space of 4 ft. is left between the keel and the ground, and as only the keel-blocks and bilge-blocks remain under the vessel there is as little obstruction as if the vessel were in a dry dock.

Slipways with side-slipping arrangements such as those described have been constructed at several fishing ports, including Fleetwood and Grimsby, for the purpose of hauling trawlers ashore. The cradle of the slipway at Fleetwood is constructed of steel and consists of eight separate carriages connected by movable links. Each carriage carries two keel-blocks and two bilge-blocks, and is mounted on 12 double-flanged cast steel rail wheels. The keel-blocks are of cast steel with oak caps, and are hinged at one end. Their free ends are lifted when necessary by means of hydraulic rams, each of which is capable of raising a load of 35 tons.

The traverser consists of eight carriages. These are constructed of steel and each is mounted on 16 wheels, which run on two rails at right angles to and below the level of the main slipway rails. Four of the traversing carriages are provided with stud link traversing chains, which are adjustable to allow each to take its fair share of the strain. These chains pass from one side of the traverser over driving sprockets on the traversing gear, which is placed at one side of the slipway site, and are then brought back through pipes underground to the other side of the slipway, where they pass round idler sprockets and then back to the opposite side of the traverser. The cradle and traverser were constructed by John M. Henderson and Co. Ltd., Aberdeen, for the L.M.S. Railway.



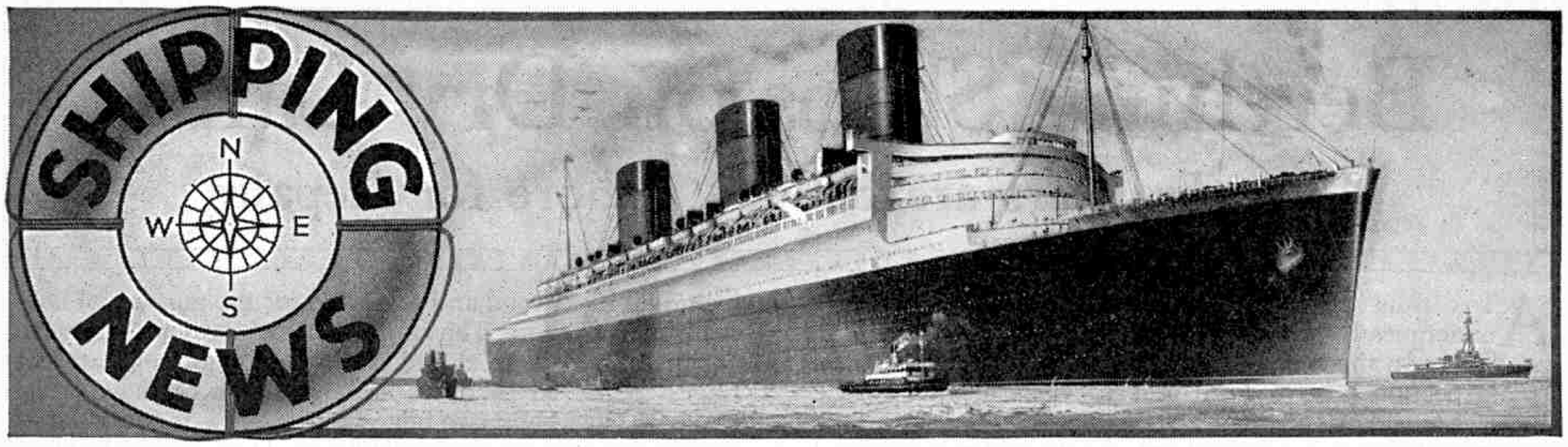
A trawler being berthed on the Centre Slipway at Grimsby Fish Docks. It is carried on bilge and keel blocks mounted on a travelling cradle, and is hauled by a powerful winch operated from the engine house in the background.

Three slipways built in a similar manner have been constructed at the Fish Docks at Grimsby. These are known as the East, West and Centre Slipways, and in this case all the drives are carried out through hydraulic gears supplied by The Variable Speed Gear Ltd., of London. The winches were supplied by John M. Henderson and Co. Ltd.

The largest of the three slipways at Grimsby is the East Slipway, the powerful winch of which is capable of hauling vessels up to 1,080 tons out of the water at the rate of 10 ft. a minute. The winch is driven by a motor of 185 b.h.p. and the maximum pull of its drum is 140 tons. When the pull exerted is reduced to 35 tons the speed of hauling is increased to 40 ft. per min. The length of haul is about 450 ft. The traversing carriage is operated by an electric motor of 90 b.h.p. and under load moves at a speed of nine feet a minute.

The West and Centre Slipways are intended for berthing vessels up to 660 tons.

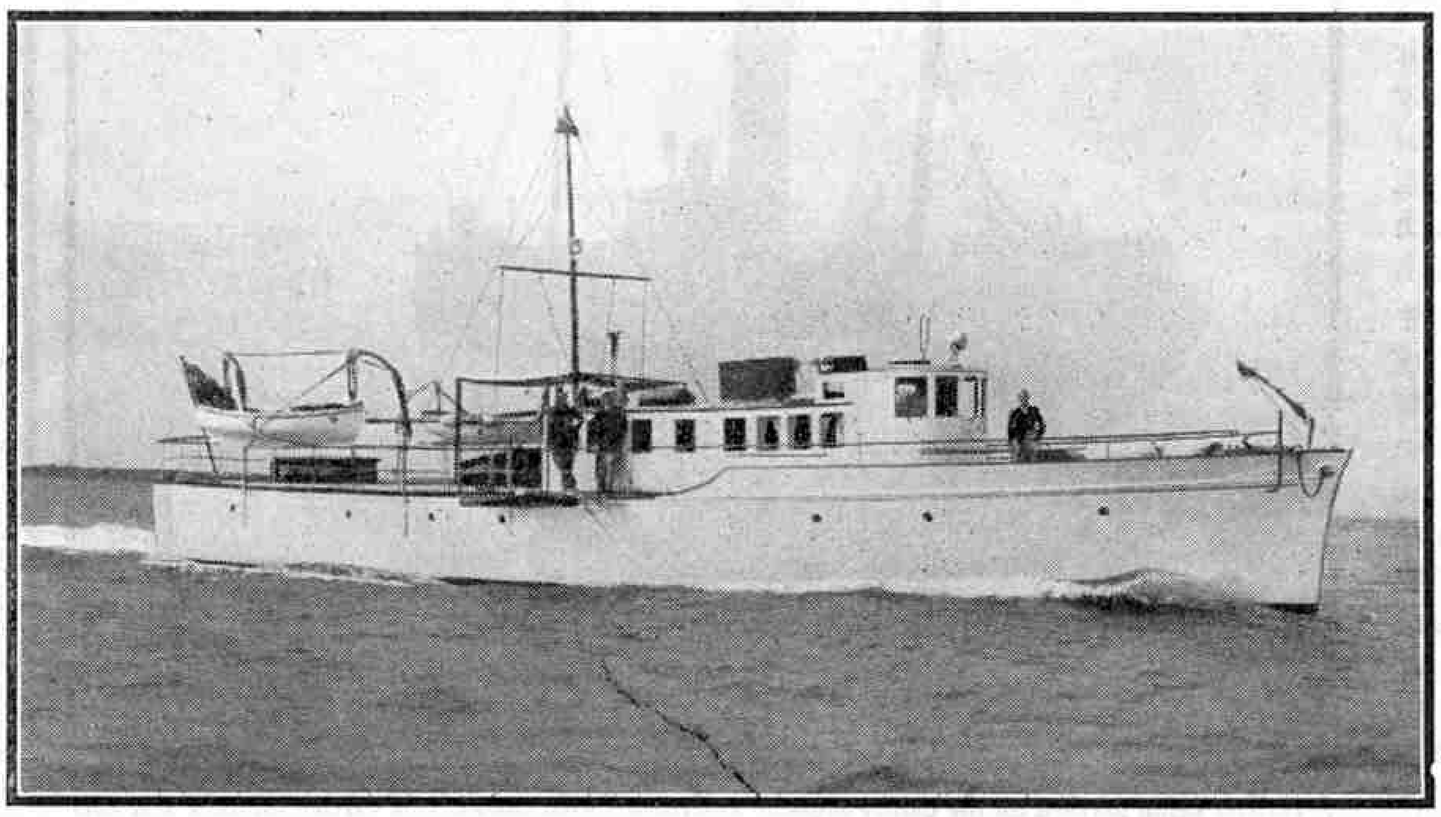
The side-slipping slipways referred to are covered by patents held by Messrs. Henderson and Nicol, Civil Engineers, Aberdeen.



Motor Yacht's New Engines

The illustration on this page shows the motor yacht *"White Lady,"* which has recently been converted to run on oil fuel. She was formerly fitted with three 125 h.p. petrol engines, but these have been replaced by two A.E.C. 6-cylinder 100 h.p. marine units, which were installed by The Ferry Engine Co. Ltd., of Woolston, Southampton. Trials have shown that the change to oil engine propulsion was justified, for the two new engines give the vessel a steady speed of almost 12 knots, while with the three petrol units, developing 175 h.p. more, she could not attain a speed of more than 14 knots. The small difference in speed is made up for by the great saving in fuel costs.

The *"White Lady"* has an overall length of 75 ft., a beam of 13 ft. 6 in., and a moulded depth of 8 ft. 2 in. The captain's cabin and accommodation for the crew are forward, while aft is the owner's cabin, and two others. The wheelhouse is well forward on the deck level, and in it the engine controls are grouped round the wheel. A new form of Lockheed hydraulic control is normally used, but there are standard telegraphs for use in case of emergency.



The motor yacht "White Lady," which is fitted with twin A.E.C. 100 h.p. 6-cylinder marine oil engines, travelling at speed of nearly 12 knots. Photograph by courtesy of The Associated Equipment Co. Ltd., Southall.

"No. 552"

The formal contract for the construction of the new express liner, *"No. 552"* at the Clydebank yard of John Brown and Co. Ltd., was signed in October last, and work has now commenced. It is expected that her gross tonnage will be 2,000 higher, and her length 12 ft. to 18 ft. more than the corresponding figures for the *"Queen Mary."*

The order for the hull castings of the liner has been placed with Wm. Beardmore and Co. Ltd., of Parkhead, Glasgow. These castings will be of exceptional dimensions and include the cast steel stern and stern frames, cast steel shaft brackets, and the rudder. The steel required for the hull is being supplied by Colvilles Ltd. The new liner will be laid down on the same stocks as those on which the *"Queen Mary"* was built, and the keel box is now under construction. The shaping of the keel frames and plates will take about four months.

Recent Additions to Our Life-boat Fleet

A new twin-screw motor life-boat has recently taken up her station at Yarmouth, Isle of Wight. This craft, named *"Yarmouth,"* is the first built by the Royal National Life-boat Institution to have twin-screw Diesel engines, each of those installed developing 40 h.p., and together giving a speed of 8¼ knots. Enough fuel oil is carried to enable the vessel to travel 237 miles at full speed without refuelling.

The new life-boat is of the Watson cabin type, and has a length of 46 ft., a breadth of 12 ft. 9 in., and in service, with crew and gear on board, she weighs 19¾ tons. The hull is divided into seven watertight compartments, and is fitted with 142 air-cases. The engine room is a watertight compartment, and each engine is itself watertight, so that it can continue running even if the engine-room is flooded. The vessel carries a crew of eight, and in rough weather can take 95 people on board. She has a line-throwing gun and an electric searchlight, and has electric light throughout.

The Civil Service has presented a new life-boat of the Watson cabin type to the Royal National Life-boat Institution, and the vessel has been named *"Civil Service No. 6."*

Four motor life-boats of the light" Liverpool" class have been laid down by the Royal National Life-boat Institution. This type of boat is for use at stations where it is necessary to launch from a carriage on an open beach. Three of the boats will be stationed at Peel, in the Isle of Man, Blackpool and Kilmore respectively.

Research Ship for British Admiralty

A contract has been placed by the Admiralty with Philip and Son Ltd., of Dartmouth, for the construction of a new research vessel. The *"Research,"* as she will be named, will be built chiefly of teak. She will have a displacement of 650 tons, and will be rigged as a brigantine. Bronze bolts will be used for fastening together the wooden frames and planking of the hull, and the anchors will also be of bronze, while gunmetal will be used in other places where metal is necessary. The ship will be fitted with an auxiliary Diesel engine specially constructed by Petters Ltd., Yeovil, so that practically all magnetic metals will be eliminated.

The reason for the use of wood and other non-magnetic substances is that the vessel is to be used for magnetic investigations, and it is vital that no part of the ship should contain properties likely to interfere with the research. The vessel also will be used in the carrying out of oceanographic surveys.

The construction of the *"Research"* is expected to occupy two years, and to cost £100,000. Her complement will number 31, including the scientific staff.

The World's Fastest Tankers

The world's fastest tankers are Japanese and have a light ship speed of nearly 19 knots, and a loaded speed of nearly 18 knots.

The average speed for the ordinary commercial tanker still stands at 11½ knots loaded, and the speed record for vessels of this type so far has been held by the fleet of the Anglo-Saxon Petroleum Company Ltd. This speed has been bettered by the 14,930-ton Dutch tanker *"Basilea,"* built by Kockums, for Camillo Eitzen and Co. This is a ship of advanced design, and is stated to have reached a speed of 13½ knots in fully loaded condition.

* * * *

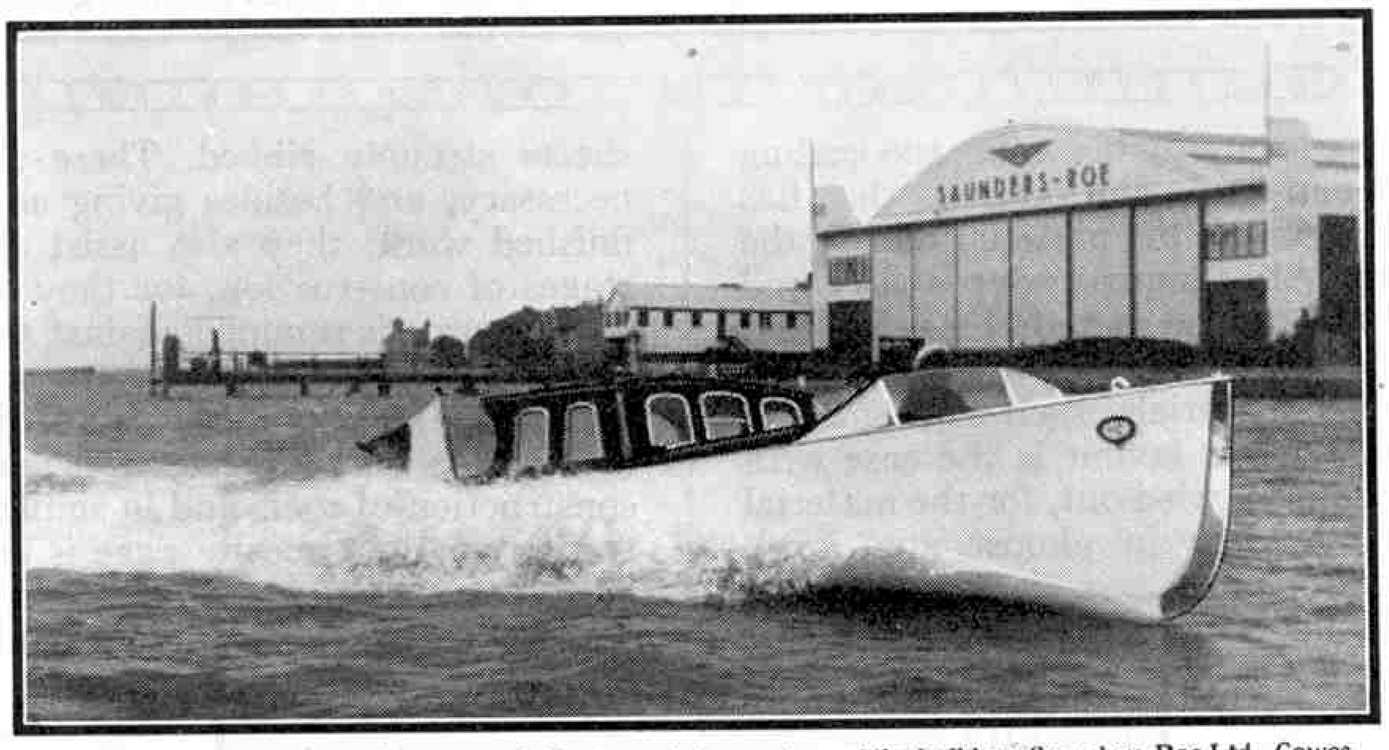
Statistics compiled by the Transatlantic Passenger Conference show that 421,018 persons travelled between the coasts of the United States and Europe between 1st January and 16th September of this year, compared with 387,109 in the corresponding period of 1935, an increase of 33,909.

An Attractive 24 ft. Motor Launch

The upper illustration on this page shows a motor launch recently built and fitted out by Saunders-Roe Ltd., of Cowes, I.O.W. It has an overall length of 24 ft., a beam of 6 ft. and a depth amidships of 3 ft. 3 in. The hull is constructed entirely of double skin mahogany.

The motor installed is a 6-cylinder Chrysler Crown, which develops 53 h.p. at 1,600 r.p.m. and 92 h.p. at 3,000 r.p.m. It runs on petrol, and this is housed in a tank under the seats in the after cockpit. An electric starter is fitted.

The launch has a forward cockpit for the helmsman, in which car-type steering gear is fitted on the port side. All controls are arranged within easy reach of the helmsman, who is sheltered behind a glass windscreen fitted in gunmetal, chromium plated frames. The stem band of the vessel is of polished brass, chromium plated, and the boat is finished in white and chromium.



A 24 ft. motor launch travelling at speed. Photograph by courtesy of the builders, Saunders-Roe Ltd., Cowes.

A French Sailing Vessel for Southern Seas

The lower illustration on this page shows the three-masted sailing vessel *"Oiseau-de-Iles,"* which is fitted with an auxiliary engine and is in service in the South Seas. The vessel has been built by the Soc. An. des Anciens Chantiers Dubigeon, Nantes-Chantenay, for the Compagnie Francaise des Photosphates de l'Océanie, and is intended for transporting passengers and cargo between Papeete, Tahiti and other South Sea islands.

The vessel has a length of 133 ft., and a cargo-carrying capacity of 250 tons. The hull is divided into five watertight compartments, and the double bottom carries water ballast. She is fitted with a lead keel, and this renders her very stable when running under sail. The wooden masts reach a height of about 110 ft. above the deck. In the fore part of the vessel are the crew's quarters and the cargo hold, while the officers' cabins, three passenger cabins and the wireless room are aft.

The auxiliary machinery consists of a Sulzer Diesel engine that develops 370 b.h.p. at 300 r.p.m. Alone it gives the vessel a speed of 9 knots, though this can of course be bettered by the use of the sails and the Diesel engine together. The bronze propeller can be uncoupled from the engine when the vessel is proceeding under sail. The auxiliary machinery consists of a 34 kW electric generator, a 15 kW auxiliary generator, an electrically-driven auxiliary air compressor, and three electrically-driven pumps for general service, fuel and fresh water. A refrigerating plant is also provided.

Union-Castle Liner's New Record

The Union-Castle liner *"Stirling Castle"* recently created a new record for the passage from Capetown to Southampton, completing the voyage in 13 days 9 hrs. 13 min. Her actual steaming time was only 13 days 5 hrs. 43 min., as there was a delay of over 3 hrs. at Madeira.

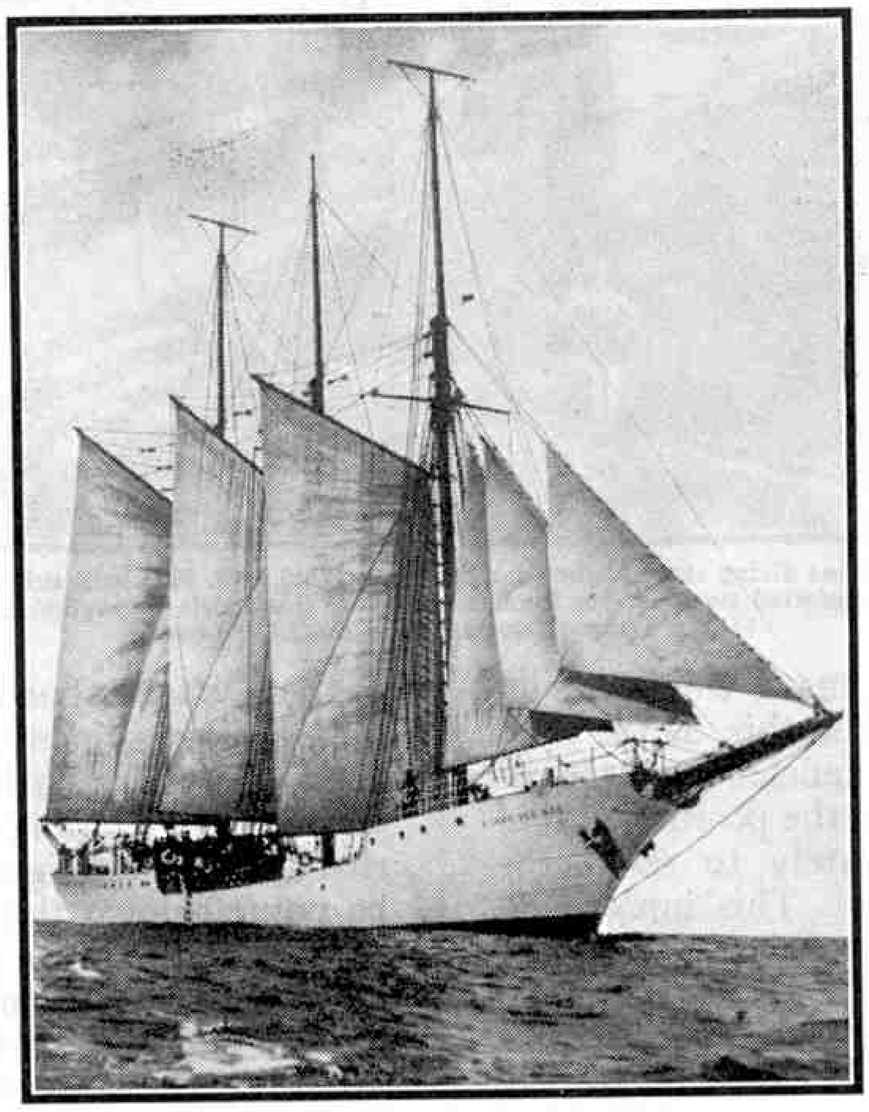
Great Ports Becoming Busier

The amount of shipping using the Port of London during the year ending December 31st, 1935, totalled 59,762,150 tons. During the first seven months of the year, 35,733,192 tons entered and cleared the Port. This is an increase of 5 per cent. on the corresponding figures for last year.

The inward and outward shipping on the Clyde for the year ending 30th June, 1936, amounted to 14,309,455 tons.

Floating Bridge for Isle of Wight

A new chain-driven floating bridge for service between East and West Cowes has been completed by J. Samuel White and Co. Ltd. The bridge is 108 ft. long and is used for the conveyance of passengers and motor vehicles. It is propelled by means of two driving wheels operating on stationary cross-river chains. The wheels are turned by oil-electric machinery comprising two 27 h.p. oil engines directly coupled to 15 kW dynamos. The main propulsion motor has an output of 40 h.p.



The "Oiseau-de-Iles," a sailing vessel fitted with an auxiliary Sulzer Diesel engine, which is in service in the South Seas. Photograph by courtesy of Sulzer Bros. (London) Ltd., London.

The *"City of Benares"*

A new liner, the *"City of Benares,"* recently made her maiden voyage. This vessel, which has a gross tonnage of 11,081 tons, has been built by Barclay, Curle and Co., of Glasgow, for the Ellerman Line's City fleet. She is the first of the Company's vessels to have two funnels, and she has accommodation for 219 passengers, all in one class. It is believed that a sister ship will be under construction in 1939, when the City Line records its centenary.

World's Largest Whaler

The largest ship in the whaling trade is the *"Terje Viken,"* built in Germany for the service of United Whalers Ltd. She was built at the Deschimag yard, on the Weser, and has a gross tonnage of 20,638, with a deadweight carrying capacity of 29,000 tons, and a displacement at that loading of 43,000 tons. She has a length of 633 ft., a beam of 80 ft., and a loaded draught of 38 ft. Her propelling machinery comprises a twin-screw arrangement of triple-expansion engines, designed for a speed of about 12 knots. The cylinders are 22 in., 36¼ in., and 58¼ in. diameter, with a stroke of 39½ in., and they exhaust into Bauer-Wach low-pressure turbines. Steam is raised in six oil-fired, single-ended Scotch boilers.

Great Russian Canal Scheme

A scheme is now in operation that will provide a direct waterway from the Black Sea to the Baltic. This will establish direct river communication between such large and important cities as Kiev, Leningrad, and Moscow, and in addition will irrigate 250,000 hectares of arid land in the Ukraine and Crimea. The Lovat River will form the main link in the new river system, and the depth of the waterway will not be less than 1.7 m., or nearly 7 ft., throughout its entire length. Reservoirs will be built on the Upper Dnieper and its tributaries to ensure the water supply necessary to obtain this depth, and the bed of the Dnieper River from Orsha to Dnepropetrovsk will be deepened.

Waterway between Montreal to New York

An international commission is studying the possibility of a deep-water route between the St. Lawrence and Hudson rivers to link up the harbours of Montreal and New York. Shallow-draught vessels are at present able to travel from Montreal to New York by way of the St. Lawrence, Lake Champlain, and the Hudson River, and the commission has to consider whether the commerce between the two countries would justify increasing the depths in the canals to 20 ft. or 25 ft. The construction of a proposed shortened route would lessen the distance between the two cities by over 1,200 miles, and lengthen the navigation season of the Port of Montreal by thirty days.

* * * *

Two new oil-electric ice-breakers are being built in Russia. The ships will be named the *"Kirov"* and the *"Kuibyshev,"* and have a displacement of 8,330 tons.

Building with Concrete

Lasting Structures with Steel Reinforcement

REINFORCED concrete is rapidly becoming the leading building material of our time. The progress that has been made in the application of this material during the last few years is due largely to its great adaptability and relatively low cost, and also to the fact that a reinforced concrete structure can be erected in very much less time than is possible with other materials, such as stone and brick. Another great point in its favour is the ease with which decorative work can be carried out, for the material lends itself readily to moulding in almost any form.

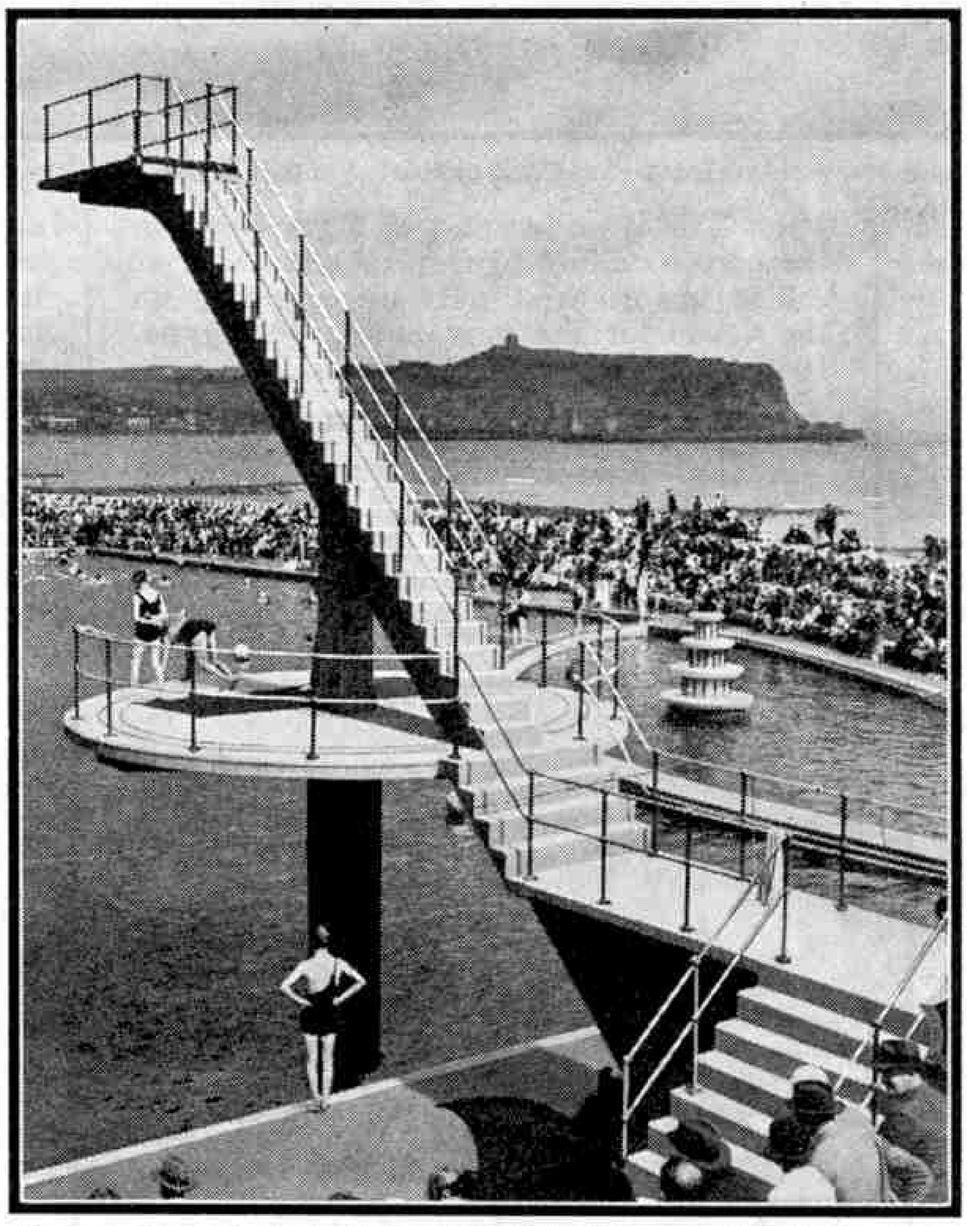
In addition to its wide-spread use for constructing all kinds of public buildings, concrete is now an accepted material for the building of bridges, highways, viaducts, power stations and water reservoirs. It is also being increasingly used in the construction of open-air and enclosed swimming baths and bathing pools, and is particularly suitable and economical for this purpose, as it is designed to offer resistance to the side pressure met with in this kind of work.

Concrete consists of a mixture of coarse and fine rock or sand particles, called aggregate, cement and water. The cement acts as mortar and when it hardens binds the aggregate to produce a solid mass. The best mixture is one in which there is enough cement to coat every particle, and to fill the spaces or voids between the grains of sand or larger particles of aggregate.

The old method of using large volumes of mass concrete had the disadvantage of excessive weight and cost. The fact that the tensile strength of concrete is low largely caused this state of affairs. Reinforced concrete has remedied this, as the steel reinforcement is added to supply the deficiency of tensile strength and is designed to be placed in the position and in the correct quantity required adequately to resist the tensile forces in any type of structure. This innovation allowed the building of structures in reinforced concrete which were impossible in mass concrete. In addition, the type of structure previously built in mass can now be erected in reinforced concrete with great economy of material, size and cost. Reinforced concrete in which steel rods or mesh is used should not be confused with encased structural steelwork in which steel joists are first built into a complete frame and then encased in concrete for fire protection.

In another method, known as the "Hy-Rib" system, the reinforcing material is made to serve a dual purpose. In this case the reinforcement is in the form of steel mesh sheets strongly ribbed. These sheets can be curved if necessary, and besides giving additional strength to the finished work, they also assist the builders in the early stages of construction, for they are so designed that the wet concrete is retained against their surface. By their use a sound and lasting concrete structure that is able to withstand high pressure is readily assured.

This type of reinforcement is particularly valuable in the construction of roofs and in similar work. The upper illustration on the opposite page is an example of its use for this purpose. It shows a concrete roof under construction at the Kemsley Mills, Sittingbourne, Kent, the world's largest paper mills, and part of the "Hy-Rib" steel mesh is visible. By using Hy-Rib 24,000 sq. ft. of flat roofing were constructed there without the need for timber shuttering. The curved ends of the Hy-Rib sheets rested upon the lower flanges of the steel beams, thereby providing the centering for the joist casing. In work of this kind the wet concrete is poured on to the sheets, levelled, and left to set. A certain amount trickles through the steel mesh and forms a "key" on the underside, to which plaster is added to make a smooth even finish for the ceiling.



The fine diving stage at the Scarborough bathing pool. It is built entirely of reinforced concrete. For the illustrations to this article we are indebted to The Trussed Concrete Steel Co. Ltd., London.

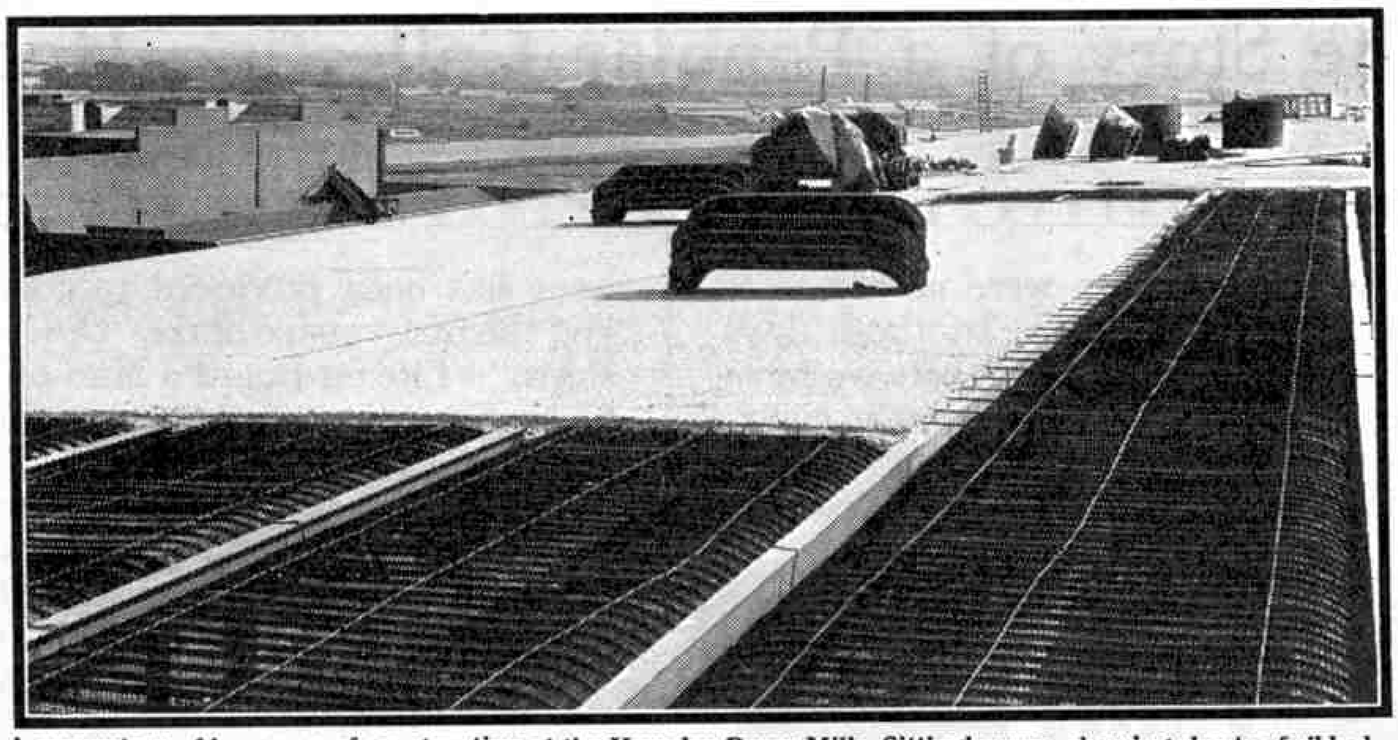
In the construction of a concrete building or other structure the plastic cement is moulded to the required shape by pouring it into forms or moulds, which are known as "shuttering." These are generally made of timber that has been suitably treated to prevent the concrete from sticking to them when it hardens. In the case of a large structure it is customary to pour the concrete into the assembled forms down chutes radiating from pouring towers to different parts of the building site. These towers are sometimes carried up to great heights, and hoists raise skips of concrete to be poured down the chutes, the nozzles of which can be swung round to the point at which the material is to be placed. During pouring the concrete is worked evenly into all parts of the forms by spading.

One of the most interesting applications of reinforced concrete is in the construction of water towers. A very good example of work of this kind is the giant water tower at Caister-on-Sea, Norfolk, shown in the lower illustrations on the opposite page. This forms part of the water supply system of Great Yarmouth, and is the largest of its type in England.

From the ground to the top of the domed roof of the tank the height of this immense tower is 161 ft. 9 in. The

concrete tank is divided into two compartments, the outer one of which holds 647,000 gallons of water, while the inner compartment has a capacity of 137,000 gallons. The total capacity of the tank therefore is 784,000 gallons of water, weighing approximately 3,500 tons, and the whole of this tremendous weight, together with that of the tanks themselves, is supported by the single concrete shaft, which has an internal diameter of 51 ft.

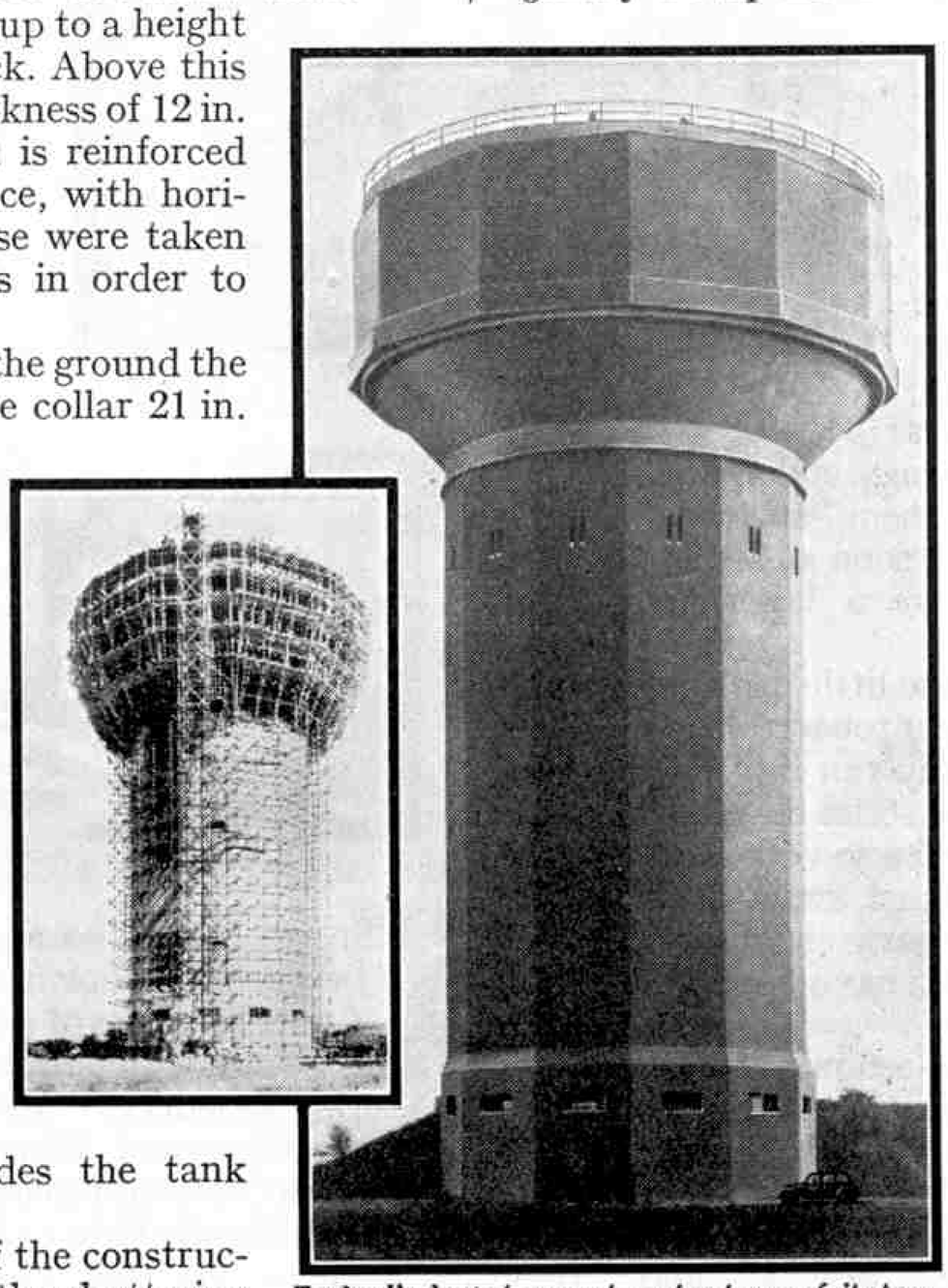
A firm foundation of course was necessary for such a massive structure. The ground at the site of the tower consists of about 2 ft. of soil over a layer of yellow clay 6 ft. in depth, under which is a bed of very compact sand and soft sandstone which extends to a depth of 45 ft. Into this three concentric rings of reinforced concrete piles 14 in. square were driven sufficiently deep to penetrate 5 ft. 9 in. into the compact sand, nearly 14 ft. below the surface, and on top of them a circular ring of concrete 9 ft. 6 in. wide by 3 ft. thick was constructed to form a base for the main shaft.



A concrete roof in course of construction at the Kemsley Paper Mills, Sittingbourne, showing sheets of ribbed steel mesh reinforcement in position.

The shaft itself has 12 sides, and up to a height of 20 ft. 6 in. its walls are 2 ft. thick. Above this level they are splayed back to a thickness of 12 in. thick. The concrete forming them is reinforced with vertical steel bars on each face, with horizontal bars outside them, and these were taken well into the adjoining side walls in order to ensure adequate hold.

At a height of 108 ft. 9 in. above the ground the shaft is capped by a stout concrete collar 21 in. wide and 4 ft. 3 in. deep, which encircles the bottom of the tank. Above this is an inverted cone that contains approximately 570 tons of concrete and 47 tons of reinforcement, and in turn has resting on it a further collar that is circular inside and 12-sided outside. This forms the base for the outer tank wall, which at its lowest level is 21 in. thick, and becomes thinner in a series of steps of 2 in., its thickness at the top being 7 in. The roof of the tank is in the form of a dome of 79 ft. span, which rises 12 ft. in the centre and is 6 in. thick throughout. A stout concrete wall divides the tank into two separate compartments.



England's largest concrete water tower of its type at Caister-on-Sea, Norfolk. The smaller illustration shows the shuttering used to give the correct form to the concrete during erection.

A particularly interesting part of the constructional work was the supporting of the shuttering used for forming the overhanging part of the tank. This portion of the work is 113 ft. above ground level and no outside scaffolding was used, the whole of the necessary support being obtained from the completed portion of the shaft itself. In making this part and the outer sides of the tank practically continuous concreting was required, and altogether 570 tons of concrete were poured. This great weight was supported on temporary or "false work" built out from the shaft and consisting of trussed timber cantilevers. These were fixed to the shaft and provided support for other timbers shaped to give the correct form or profile for the cone shuttering, which was made up in specially designed panels.

The concrete used in building the tower was produced by two mixers, which served two skip hoists placed opposite each other on the centre line of the tower. The mixture for the tank was made up of 1 part of specially fine ground cement, $1\frac{1}{2}$ parts of fine aggregate and $3\frac{3}{4}$ of coarse aggregate. No waterproofing compound of any kind was used, and the results have been entirely satisfactory.

Access to the tanks is given by a steel staircase that is arranged in seven flights and leads to a gallery platform immediately below the upper windows of the shaft of the tower. From there a short staircase rises to a second cross gallery leading to an access shaft 6 ft. in diameter. The cross gallery is suspended from steel hangars fixed to connections that were cast in the bottom of the tank during construction. A vertical ladder up the access shaft leads to the valve platform, and also to the roof, and the tanks themselves can be entered when necessary by means of galvanised iron ladders.

Water is delivered to the tower from a pumping station at Ormesby about 3 miles away, through a 24 in. cast iron pipe, which passes up inside the tower shaft. A special valve is fitted so that the supply pipe can be made to serve also as the delivery pipe from the tank. A 15 in. diameter overflow pipe is provided alongside the supply pipe, and the inner tank supply and delivery pipe is connected through the division wall to that for the outer tank. Wash-out pipes of 6 in. diameter lead from the lowest level of each of the tanks and are connected to the overflow pipe. All the valves are operated from the valve platform, which is 2 ft. above the highest water level.

The tower was built to the instructions of the Chief Engineer to the Great Yarmouth Water Works Company, and the design and construction of the tower were entrusted to The Trussed Concrete Steel Company Ltd., London.

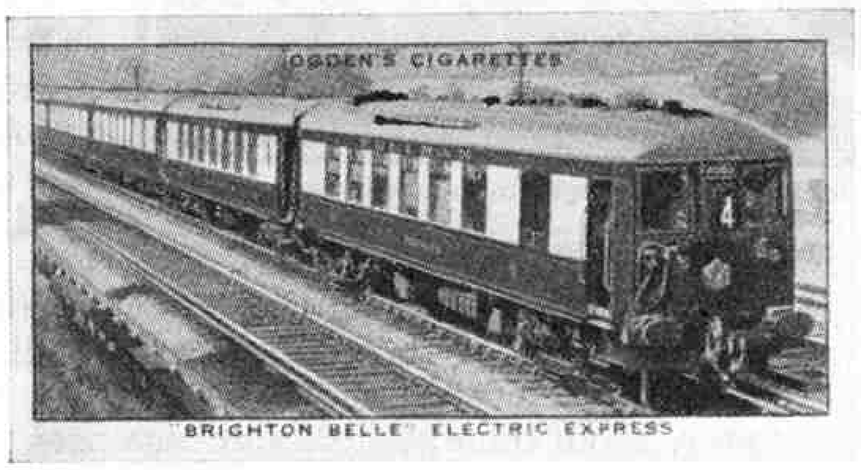
Another interesting example of unusual concrete work is the diving stage illustrated on the opposite page. This has been erected at Scarborough and is constructed entirely of specially mixed concrete with steel reinforcement.

Cigarette Cards

The Story of a Popular Collecting Hobby

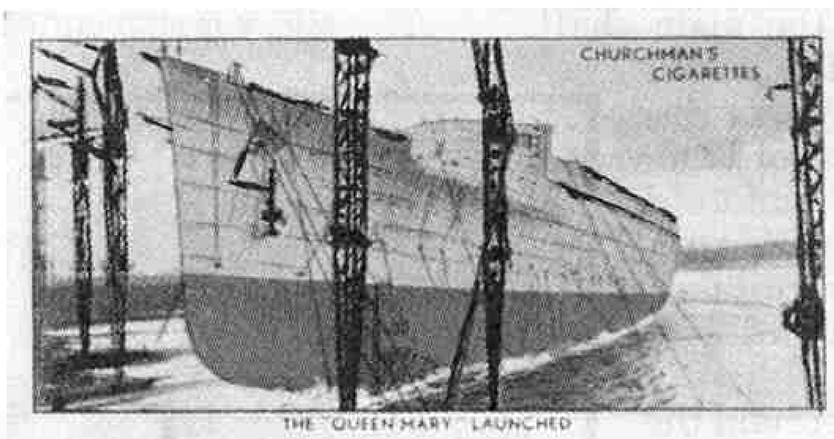
By I. O. Evans

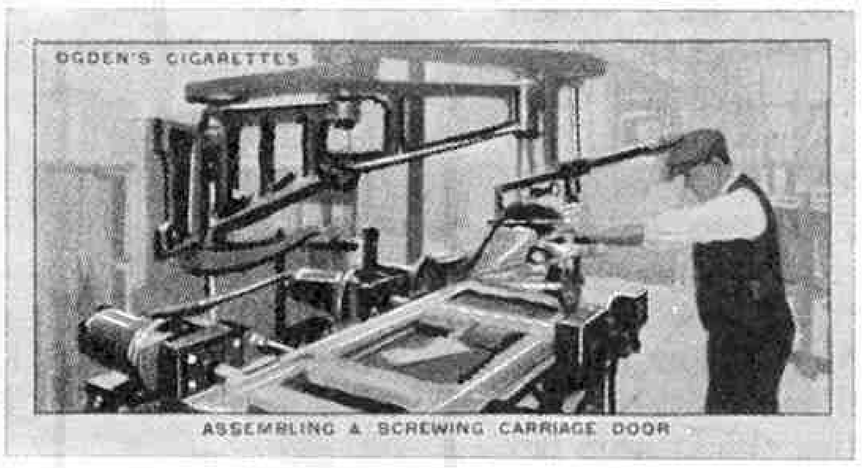
UNTIL about fifty years ago there were no cigarette cards, at any rate in Great Britain. In those days cigarettes were not sold in the stout card packets we have to-day, but in flimsy packets of paper. To keep the cigarettes from being crushed, little slips of cards were inserted, just big enough to go into the packets. These "stiffeners," as they were called, were at first blank. Then, in 1887, W. D. and H. O. Wills hit on the idea of using them for advertisement. They began by printing wording on them; then they used a representation of a packet of "Gold Flake"; and from this they went on to pictures of tins, and then to showcards and posters. At last, in 1895—perhaps they had found that people were collecting their little advertisement cards—they put on pictures of general interest. One of the first series they issued was "Ships"; another was "Soldiers and Sailors of all Nations"; another was "Kings and Queens." The "cigarette cards"—they still call them "stiffeners" in the trade—proved very popular, and soon other firms were issuing them. Nowadays we have a large number of new series every year.

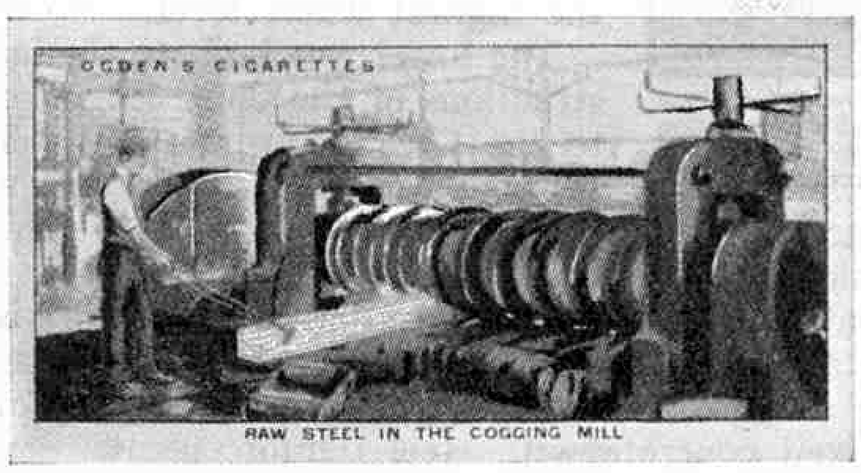


It is surprising how many of these little cards are issued. The distribution by one of the larger tobacco firms of cards dealing with a popular subject may run into hundreds of millions of one series. Thousands of series have been issued, and though not all of these have been so very big, the total of cards that have been printed must amount to billions. Many of these are thrown away, many are treasured for a time and then lost; but very many have found a home in the albums and cases of collectors.

Of the many subjects that have been put "on the cards," those dealing with the different branches of engineering are very popular. Ships, as we have seen, were among the first subjects dealt with, and they have been favourite subjects right down to the present day, when a special issue has been produced to commemorate the launching and the first voyage of the "*Queen Mary*." "Famous Steamships," "Life on Board a Man-of-War," "Life on a Liner," "The Evolution of the Steamship," "Ships of all Ages," "Strange Craft," "The Story of Navigation," "The Rig of Ships"—these are a few of the series that deal with navigation, from coracles and birch-bark canoes to the submarine, the dreadnought, and the transatlantic liner.







Railways, too, have been the subject of many a series. "Landmarks in Railway Progress," "Wonderful Railway Travel," "Famous Expresses," "Engineering Wonders"—these deal with the history and romance of the railroad; while "Modern Railways" reminds us of present-day locomotive engineering, "Construction of Railway Trains" gives us an insight into the work of the building sheds, and "Model Railways" recalls our own small-scale experiments as railway engineers.

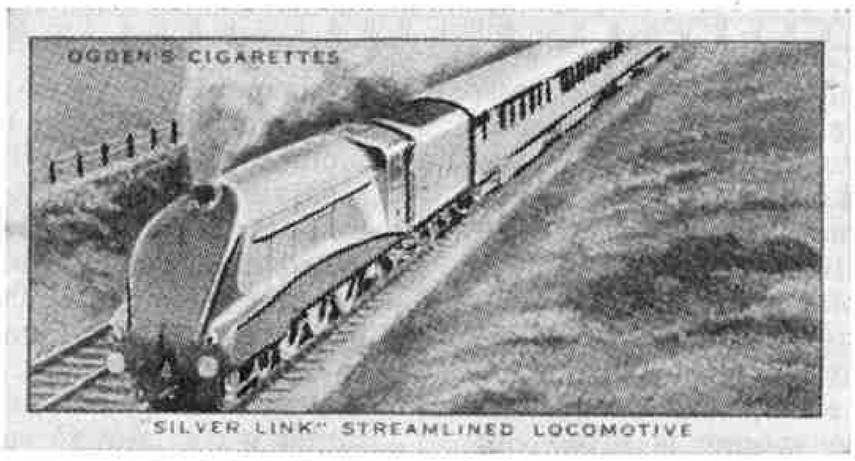
For shipping and railways information was ready to hand, but aeroplanes were a new thing, and at first one or two mistakes were made in describing them. Two cards had their descriptions interchanged, so that the famous Blèriot monoplane, the first to fly the Channel, is described as a triplane, and an Avro triplane, with three planes in its tail and wings instead of one or two, appears as a monoplane! As aviation progressed, however, its record on the cigarette cards progressed also, and there appeared sets illustrating "Speed, Land, Sea and Air," "The History of Aviation," "Types of Aeroplanes," and "A Day on the Airway."

Other branches of engineering also are dealt with, including "Modern Inventions," "Famous Inventions," "Engineering Wonders," "Motor Cars." So are science, "Scientific Inventions and Discoveries," and art, "Statuary" and "World's Masterpieces." The handyman will welcome a set on "Tools and How to Use them," and for Scouts there have been no less than five series, including not only general troop work, but hints on most of the badges and illustrations on natural history.

Sport is naturally another favourite subject. Recently series have been issued dealing with "Famous Footballers," "Cricket, Tennis, and Golf Celebrities," "Football Teams," "Races—Historic and Modern," and "Boxing Lessons." Film stars appear on a large number of series. When the cigarette cards first came out the cinema had not "arrived,"

but music-hall artists and famous actresses were just as popular as the film stars are to-day.

Natural history interests many of us, and whatever branch of it we like we shall find sets to suit us—"Feathered Friends," "Butterflies and Moths," "Birds and their Eggs," "A Kodak at the Zoo," "British Trees and their Uses," "Garden Life," "Life in Ponds" and "Streams" and "Constellations." For lovers of outdoor scenery are sets showing "Beauty Spots of Great Britain," and "Glorious Britain." Many parts of the Empire, and some foreign countries, have had sets, or parts of sets, devoted to them, and there have also been series with an historical interest.



"SILVER LINK" STREAMLINED LOCOMOTIVE

Every important event has brought forward its own series of cards. Several appeared relating to the Boer War, and during the Great War there came out a number of sets, "V.C. Heroes," "Celebrities of the War," "Army Corps and Divisional Signs," "Women on War Work." There have been sets dealing with the Gods and Goddesses of ancient myth, with "Scottish Clans," "Famous Escapes," "Eastern Proverbs," "Interesting Door-Knockers," nursery rhymes, characters out of *"Robin Hood," "Lorna Doone," "David Copperfield," "The Swiss Family Robinson,"* and the adventure stories of Conan Doyle. Indeed, it would be hard to say what subject has not been turned into a series of cards!

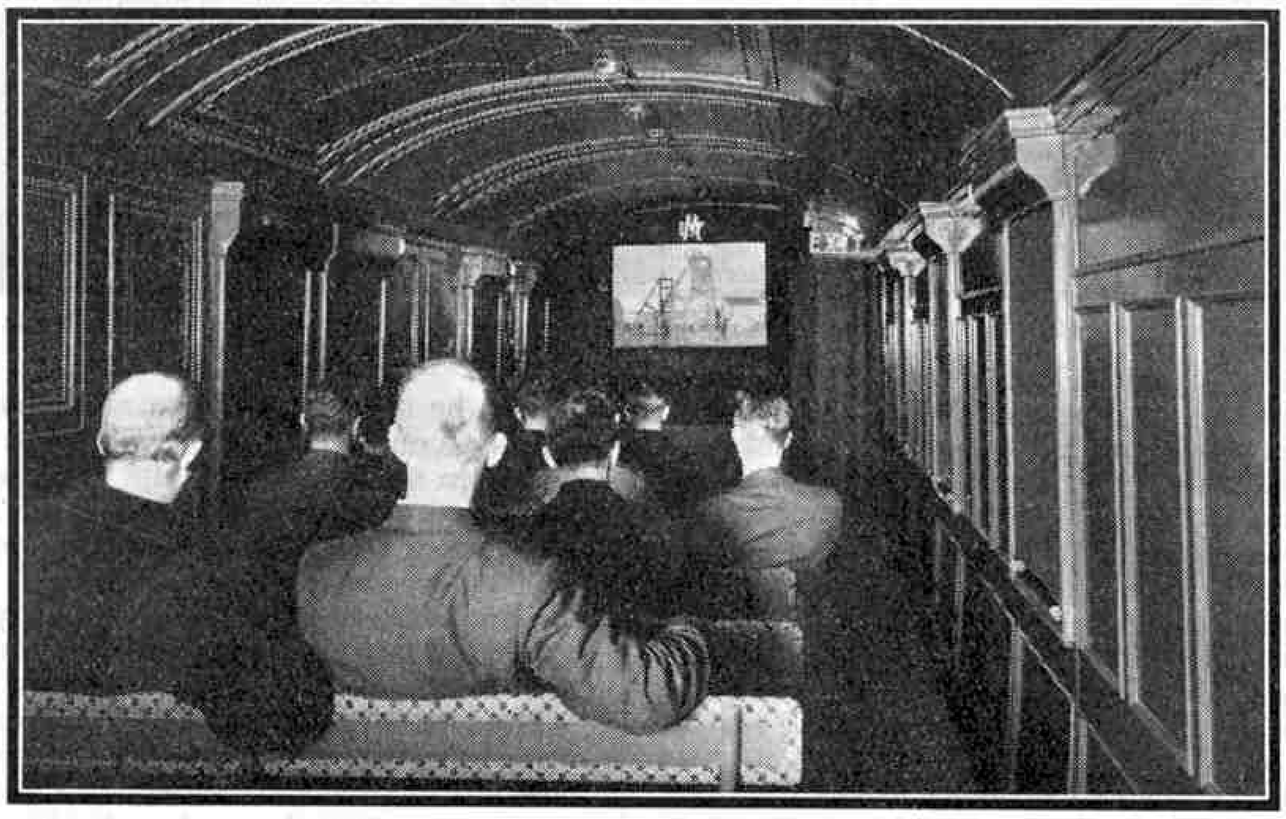
When so many cards are produced, it is only natural that some of them should show mistakes. Such cards, as soon as the publishers know about them, are replaced by corrected issues; for this reason there are only a few of them to be had, and collectors seek them anxiously and are willing to pay more than usual for them. Some of these misprints are quite amusing. One card shows a picture of the last French Emperor, Napoleon III; on the back is the story of how Winston Churchill escaped from the Boers! Among the "Famous Characters of Fiction" illustrated on the cigarette cards was Uncle Tom, the negro slave—a rare misprint shows him with a black face but with white hands and feet!

In America cards were issued earlier than in Britain. Canada, India, and South Africa have produced their own series; so have lands so far apart as Belgium and China. Germany has issued many fine series, but recently it has devoted them all to spreading the ideals of Herr Hitler and his Nazis. In Italy a set is being issued on "Hints during Air-raids"; a complete set of the cards can be exchanged for a gas-mask. More peaceful is Holland, which has produced beautiful pictures of Natural History subjects. A serious book on the cactus plant has, instead of the ordinary illustrations, spaces where cigarette cards on the subject are to be gummed in! From Siam we get some interesting sets, including cards that show views and others that have cock fighting scenes and pictures of giants on them.

The L.M.S.R. Mobile Cinema

The L.M.S.R. make considerable use of films for educating their staff in the various subjects connected with the operation of their huge railway concern. These films are made on L.M.S.R. premises, with employees acting as "extras," and give members of the staff accurate knowledge of subjects that would otherwise be lost to them owing to the fact that they seldom have opportunities of learning anything about the company and its activities outside their own particular sphere. For instance, porters and clerks are able to become familiar with many of the intricacies of the building of a modern locomotive or coach, branches of railway work with which they do not come into contact.

In the past these educational films have been exhibited in halls at various centres on the system, but the inconvenience of this arrangement has led to the introduction of the L.M.S.R. mobile film theatre. This was introduced last month, and is a former L.N.W.R. coach converted for its present use at the L.M.S.R. Carriage and Wagon Works at Wolverton. It represents the first attempt to take purely instructional films direct to the staff at the place of their employment, and is claimed to be the first railway vehicle of its kind in the world to be equipped with a standard 35 mm. professional projector. Its introduction marks a further step in the development of the use of films for educational purposes.


The L.M.S.R. Mobile Film Theatre. This has seating capacity for 52 persons, and is now touring L.M.S.R. centres, exhibiting films showing various branches of railway working.

Many of the films to be shown in this theatre have been prepared to demonstrate to the staff the right and wrong methods of carrying out work in various branches of railway activity. These films are to be shown to the employees at railway stations and goods depots throughout the country. One film deals in a simple and straightforward manner with the many problems connected with the efficient handling of trains at stations. Much valuable time is lost, especially at stations of the larger and busier type, when the loading and unloading is not carried out as quickly as possible, but lost time can be regained if the work of the station staff is efficient. The first part of the film deals with the wrong methods. This is followed by scenes showing how operations ought to be carried out, and better and more correct working should be the result of this effective demonstration. Other films in the series deal with salesmanship and work at goods depots.

The mobile theatre was demonstrated at Euston, and commenced its tour at Birmingham last month. It will continue touring until 18th June, by which time it will have visited 68 stations and depots, according to the present schedule, and will have given a total of 572 performances.

The theatre is self-contained and has a seating capacity for 52 persons. The seats are arranged to hold four in a row, and the floor is raised from the front to a height of 15 in. at the back, so that every member of the audience has an uninterrupted view of the screen. Power for the projectors, and for lighting and heating, is obtained from a motor generator set driven by a high-speed Diesel engine. The engine is fitted with a governor and maintains the steady speed of 1,500 r.p.m. Sufficient fuel oil to last a week is carried, and this is stored in tanks in the roof of the coach. The oil is fed from the tanks to the engine by gravity.

The equipment in the operating box includes two projectors, one of which is for use with sub-standard 16 mm. silent film, while the other is for projecting full size 35 mm. sound film, such as is used in a modern cinema theatre. The 35 mm. machine is a Phillips Transportable. The illumination is given by a 750 watt. incandescent lamp, and the machine is equipped for playing gramophone records.

Skeletons in the Bath Room

How Sponges are Harvested from the Sea

By Harold J. Shepstone, F.R.G.S.

HOW many of us, when we sponge ourselves down in the bath room, realise that we are making use of a skeleton, or rather of the skeletons of countless thousands of creatures. "A sponge," says Professor Huxley, "is a kind of sub-aqueous city, where the people are arranged about the streets and roads in such a manner that each can easily appropriate his food from the water as it passes along." The fact is, the sponge is something of a zoological wonder. Originally it was looked upon as a plant, but in reality it is a very low form of animal life. It is almost at the bottom of the zoological ladder, and takes the form of a jelly-like mass, which separates itself from the shell or skeleton when the sponge is lifted out of the water and squeezed.

In its native state the sponge also is the home of numerous small sea creatures. Dr. A. S. Pearse tells how he studied the occupants of sponges at the Marine Biological Station at Tortugas, an island off the coast of Florida. He secured a sponge, about the size of a large washtub, and placed it in a container so that no animals would be lost. He cut it into thin sections, as one would slice a loaf of bread. Each slice was then carefully examined and the animals picked out, placed in bowls, and counted under a reading glass of considerable magnifying power. When the count was completed, Dr. Pearse learned that this particular living hotel had housed 17,128 guests, which meant that there were approximately two animals to every cubic inch of its volume.

The sponge fishing fleet of the Bahamas. About 400 schooners and sloops are engaged in the sponge industry of these islands.

Among this great host of creatures were five fishes, each about an inch in length, having exceedingly slender bodies well adapted to life in the canals of the sponge. Annelid worms to the number of 229 were taken from the canals and, embedded in the tissues of the sponge, were 38 barnacles, which were in direct connection with the sea through surface holes. Of the animals that had taken up their abode in this single sponge, small shrimps were by far the most numerous, however, the count registering 16,352.

Even when all animal life has been removed from a sponge and it is nothing more than a skeleton, its animal nature has not been entirely destroyed. This is easily proved by subjecting a small piece to a flame. It does not burn brightly, but it leaves a small, charcoal-like residue when entirely burnt up. All the time that it is burning it gives off a smell very similar to the burning of hair, a result that is seldom observed in the burning of vegetable matter.

When we say "sponge," we are inclined to think of the familiar article used for the toilet and bath. As a matter of fact, there are about 2,000 different kinds of sponges, and they vary considerably in size, from a pin's head to several feet in height. They are of various shapes and colours, and even the so-called bath variety shows considerable differences in quality.

While sponges are to be found all over the world in every sea, they develop better and reproduce more freely in some beds than in others. Until fairly recently they were regarded as peculiar to the waters of the Mediterranean. Then it was discovered that sponges were as common as mussels on the reefs between Florida and the Bahamas. The result was the establishment of a sponge industry in these islands that in some respects promises to rival that of the Mediterranean.

The spongy skeleton adheres very firmly to the sea bottom, or the rocks on which it grows, and how to obtain it uninjured is a problem which the fishermen have endeavoured to solve in various ways, including diving, dredging, and harpooning or hooking.

Diving is the oldest and, from the merchant's point of view, the safest and most profitable method, and it has been practised round about the Greek Islands, Sicily, the Levant, and the north of Africa for ages. There are 6,000 men now employed in the Levant sponge-fishery alone, and about the same number are at work in other parts of the Mediterranean. These Greek divers are trained to their task almost from infancy, and become gradually accustomed to working under water and to enduring pressure so great that less than half of it would mean death to an untrained man.

These undressed divers work from boats. On arriving over the beds where sponges are known to exist, the diver takes a length of rope. One end is made fast to the boat, while a large white stone is tied at the other end through a hole that has been drilled in it. Picking up the stone, the diver fastens it loosely to his chest by giving the line a turn or two round his body, and without more ado plunges overboard.

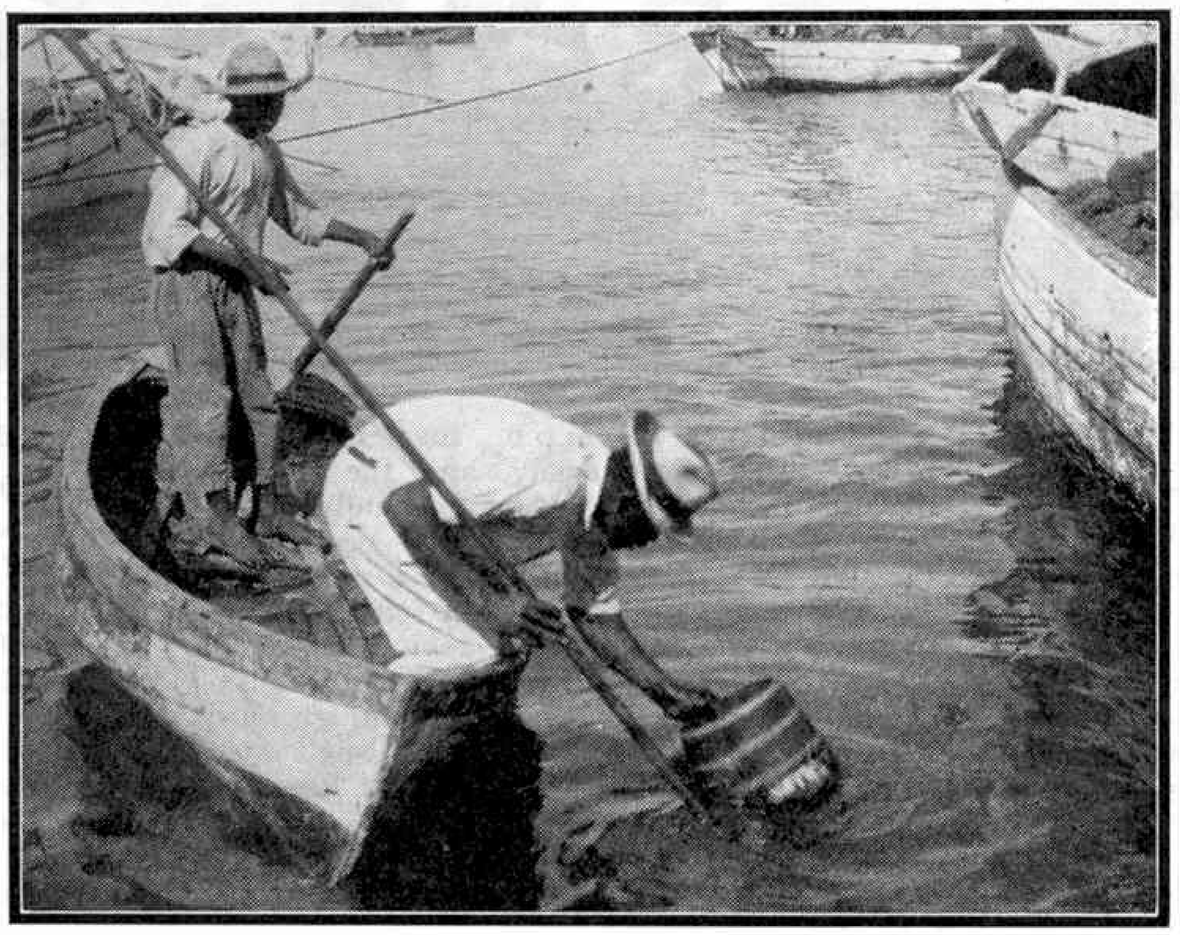
A second or two later he is upon the sea bottom, where, if the water is clear, he uses the white stone as a landmark. He leaves go of the rope and wanders round, always able to find his way back as long as he can see the stone. As often as not there is trouble going on at the bottom, however; a fight among the ground-fish, or a dolphin poking about after molluscs, makes the water as thick as a London fog, and in some grounds even the man's own movements are sufficient to cloud everything. The diver then dare not let go of the rope, but must carry the stone about with him. Hurriedly tearing off the sponges that lie to his hand, he stuffs them into a net-bag slung from his shoulder, and gives a couple of jerks to the rope. He and the bag and the stone are then swiftly hoisted up. Although sharks are plentiful in these waters, it is seldom that a diver is attacked, the splashing and shouting being sufficient as a rule to frighten them away. If a shark becomes too venturesome it is liable to be shot, for a gun is carried in every boat for that purpose.

On reaching the surface, the diver is hauled into the boat to get his breath while the next man goes down. I have seen it stated that whenever these fellows come up from the sea floor, blood flows from their mouths, ears, and noses. How many gallons of blood do the authors of such a statement suppose a man can afford to lose in the course of a day? As a rule, a Mediterranean diver expects to bleed in this manner only when he goes down for the first time after being away from such work some months, as, for instance, on the first day of the season, and then only once. What is more, the divers regard this as not only a healthy sign, but as a proof that they are fit for their work. Indeed, if any man should find that bleeding does not then occur, he will not attempt another descent that day, nor will he start regular work until he has bled.

From five to 10 fathoms is the usual depth to which these naked divers descend, though a few will venture to 13 and even 15 fathoms. The brief time which they are able to remain under water at these depths is of little use for such hard and lengthy work, however, and the effort seems almost to rob them of the power to wrench the larger sponges free from their natural moorings. The average time

spent on these descents is 80 seconds, but a few can remain down for as long as 3½ minutes.

Sponges grow at varying depths, much below 10 to 15 fathoms. To secure those at depths between 15 and 50 fathoms professional divers are employed, and as they are supplied with air they can remain below for some time. As soon as such a diver reaches the bottom, he takes from his shoulders a coil of thin cord which he has brought down with him. This is known as the "track-line." Perhaps one end is weighted; if not, he ties it to whatever fixture he can find, and then sets off on his travels to the end of his tether, which is a fairly long one. He lets the trackline run from his hand as he goes, stopping every now and then to gather the finest and largest sponges he can see, and packing them as closely as possible in the net-bag that hangs over his shoulders. When his bag is full, or he finds he cannot remain down any longer, he carefully fastens his bag and even ropes it to his body, and then gives the "pull-up" signal —one long sustained pull till the hauling begins. The reason for tying the bag to the diver's body is to prevent its getting entangled with his lines while he is being hauled up.



Hooking sponges in the Bahamas. The fisherman detects the presence of a sponge by means of a bucket with a magnifying glass in the bottom.

As these men gather sponges, so they keep a watchful eye on possible submerged treasures. The waters off Greece, Sicily and Cyprus are looked upon as the oldest if not the richest submarine treasure grounds in the world, and many valuable articles have been recovered by the sponge gatherers. Sometimes the diver brings up a "surprise packet" on speculation. I knew one Mediterranean diver who, with great trouble and at some risk, succeeded in taking on board a mysterious iron box, that suggested at least deeds, if not banknotes, jewels, and bonds. When he came to open it in the presence of an admiring and expectant crew, he found nothing but a ruined silk hat and a dozen collars. To add insult to injury, the collars were a size or two too small for every man on board!

In very deep water, that is below 50 fathoms, sponges are gathered by dredging. This method is used only in the winter months, because then the equinoctial and autumn storms have had plenty of time to tear up the seaweed that otherwise would fill up the dredge, or hamper the movements of the gear. In any case, dredging is not regarded as eminently satisfactory, as it is inclined to damage many of the sponges.

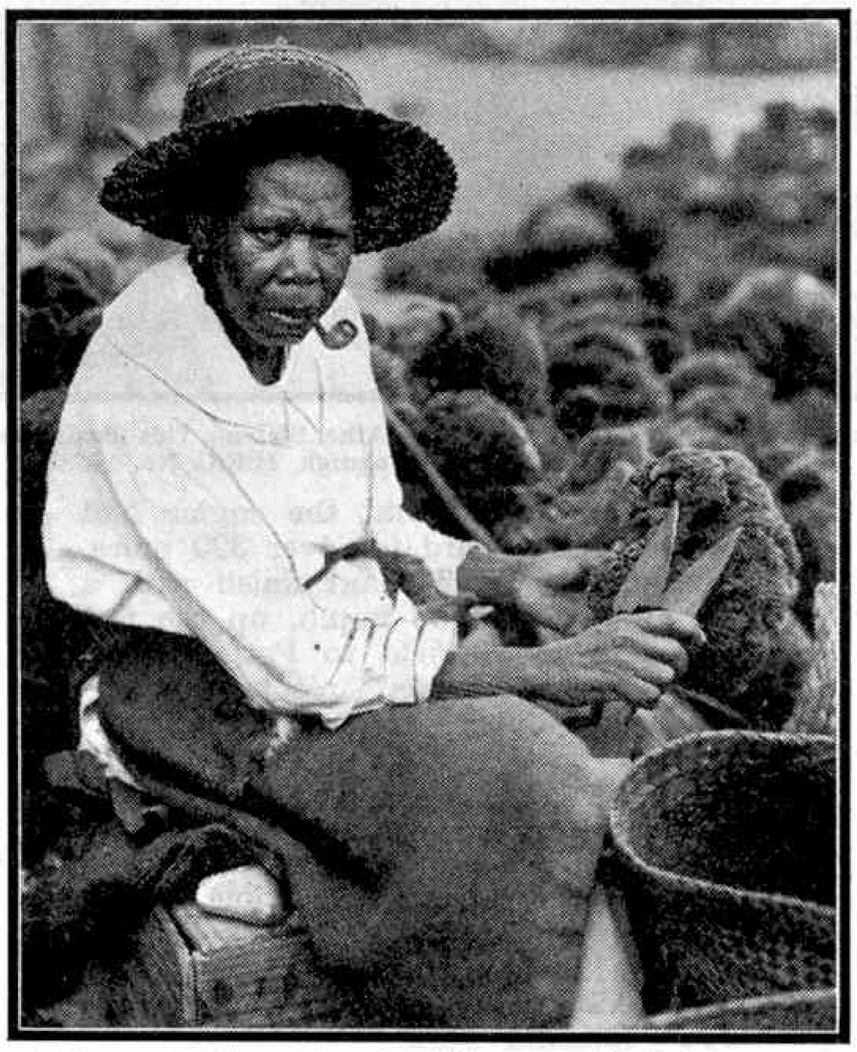
The dredge used is a somewhat formidable-looking affair, resembling an immense packing-case 3 ft. high and about 18 ft. square. It is open at the top, and has a large net-bag hanging from the bottom. The meshes of the net are 4 in. square, and are made of camel's-hair cord as thick as a man's finger. This unwieldy apparatus is thrown overboard on a good sponge-ground and towed gently along like a trawl. It is then hauled up, the sponges are taken out, and the dredge is dropped overboard again.

Along the east side of the Adriatic Sea sponges are found at almost all depths. Those close to the surface are obtained by means of a kind of hooked harpoon, resembling in design a three-pronged rake. The fishermen detect the presence of the sponge by means of a spy-glass. This is nothing more than a bucket with a fairly powerful magnifying glass in the bottom through which the fishermen locates the sponge. In the Adriatic the use of the spy-glass is made easier in a very ingenious, if simple manner. Every boat carries a small supply of pebbles, and, when the look-out man wishes to inspect the ground, he dips four or five of these in oil and tosses them one by one in a curved line in front of the boat. Each pebble, as it sinks, scatters tiny drops of oil all the way down, and these help to clear the water, and thus afford a less obstructed view. When he detects the presence of a sponge, the fisherman proceeds to tear it loose with his rake. This task calls for skill if the sponge is to be obtained whole. The aim is to slide the rake immediately between the rock and the root of the sponge, and then to wrench the prize off bodily and bring it to the surface.

Hooking is the method employed by the fishermen of the Bahamas, where the sponges are not only close to the surface, but also are very plentiful. Every week a fleet of schooners sets off from Nassau to the sponge fishing grounds. The principal ones are the Great Bahama Bank and the Little Bahama Bank, lying off the islands of Andros and Abaco respectively. The former, known as "The Mud," is 200 miles in length and 64 miles in width, and the latter, known as the "Southern Mud," has a length of 143 miles, and is 10 to 38 miles wide. There are also smaller grounds, the whole covering several thousand square miles in extent, and forming what is believed to be a virtually inexhaustible source. Many varieties of sponges are obtained from these grounds.

Each schooner carries one or more two-men dinghies or dories, which are like those used by the Newfoundland cod-fishers and are manned largely by negroes. While the ships lie at anchor the little boats pull about over the reefs, the sponge-hooker lying over either stern or bows, and snatching at everything that looks promising.

After a week of good "catches," the fleet returns and lands its cargo. The sponges are first thoroughly rinsed and squeezed until every particle of gelatinous animal matter has been got rid of. They are then exposed to the air for a day or two, after which they are thrown into a "crawl," a crude wooden tank of water, and left to clean themselves. There they remain for about a week, when they are taken out and trodden vigorously by bare-footed men till they are once more squeezed as dry as possible. They are then passed to the warehouse, where they are again washed, clipped, sorted out according to size and quality, and compressed into bales ready for transport.



A sponge clipper at work at Nassau, in the Bahamas.

Some 400 schooners and sloops are engaged in the industry. The voyages are undertaken on shares, the owner receiving one-third of the net profits and the remainder being divided between the captain and the crew. Sponge fishing is the principal industry of the Bahamas, and every year sponges worth from £110,000 to £152,000 are exported from the islands.

Attempts are now being made to improve and develop the sponges of the Bahamas by artificial propagation. Sponges are developed from very small egg cells, about 1,000 of which would be required to form a line an inch in length. A very small creature is developed from the egg. This swims about freely for a time before settling down and beginning to grow into the sponge with which we are familiar, and ordinary small sponges actually consist of several individuals having their fibres closely interlocked with each other.

For the past few years biologists have been growing sponges on the reefs of the Bahamas with encouraging results. Various methods of production have been tried, and subdivision also has been practised. When a piece is cut off a sponge, it continues to grow, and sponges have been divided into sections of about two inches in length and replaced in the sea, with the result that in 12 to 18 months they have increased to 25 or 30 times their original size. Furthermore, these artificially-propagated sponges have no roots, and are much more robust than those grown naturally.

Fine Performance by L.N.E.R. "Pacific"

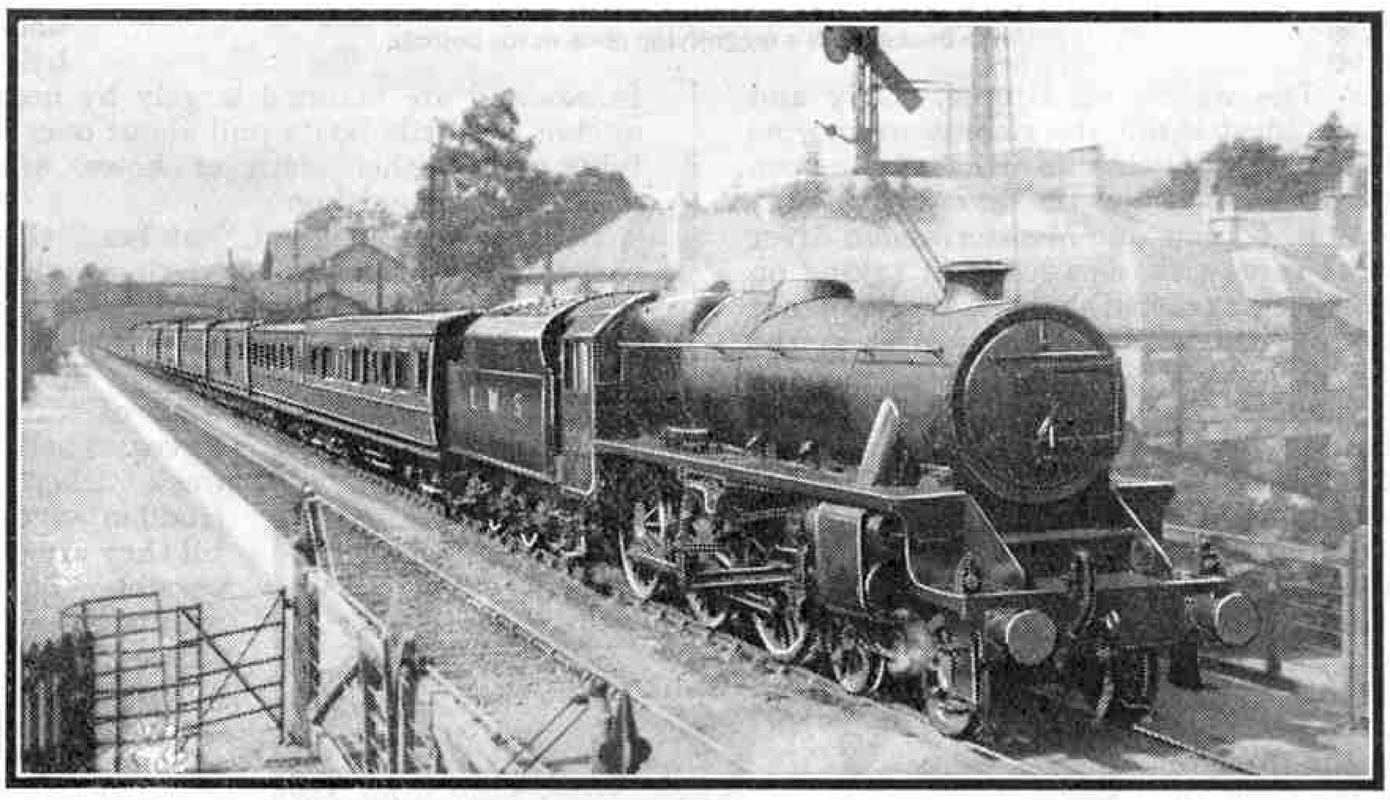
On the last day of the summer service *"The Flying Scotsman"* completed yet another successful season with a remarkable run from Edinburgh to London. During the last fortnight in September the train stops at Newcastle for five minutes in both directions, though still completing the journey between the two capitals in 7¼ hours. As a consequence, the locomotive work involved is considerably harder than during the non-stop period, but the stop enables passengers to join and leave the train at Newcastle, and obviates the necessity of carrying two engine crews for the whole distance, as the locomotives are re-manned at Newcastle. Although the same engine works right through from Edinburgh to London when the Newcastle stop is made, there is of course no need to use a locomotive fitted with a corridor tender, and so during this last fortnight of the summer service several hitherto unfamiliar engines have put in an appearance at Edinburgh. On this last day the engine was No. 4474, *"Victor Wild,"* and the load throughout from Edinburgh to London 445 tons tare, 480 tons with passengers and luggage.

On a through run of this length it might be imagined that the engine would require nursing somewhat in the early stages, but so confident are the drivers of the staying power of their locomotives that the start from Edinburgh is invariably very brisk. On this occasion indeed, the train was three minutes early before it was 30 miles away from Edinburgh. Dunbar, 29.1 miles, was passed in 31 minutes, and after a very fine climb of the Cockburnspath bank with a minimum speed of 27 miles per hour up the 1 in 96 grade, Grant's House, 41.2 miles from Edinburgh, was passed in 47 minutes. After this the running became rather easier, but in spite of a long slowing to 30 miles per hour for permanent way repairs, and a slack for pit fall troubles near Cramlington, the 124.4 miles from Edinburgh to Newcastle were completed in 139¾ minutes, 4¼ minutes early.

The London driver who took over at Newcastle again started very briskly and was three minutes early at Northallerton, but after a long spell at 70 m.p.h. across the plain of York, where for 22 miles speed averaged 69 m.p.h., matters were taken rather more easily, and the three minutes in hand allowed to gradually slip away until the train was just on time through Grantham. But in these days an express train that does not exceed 80 m.p.h. on the magnificent racing stretch from Stoke Summit down to Peterborough is a rare phenomenon, and sure enough on this occasion there was a fine spell at 84 m.p.h. in the neighbourhood of Essendine.

After Peterborough, passed a minute early, the running was magnificent, especially considering that the engine had now been going hard for over 320 miles, and after a most brilliant finish with a minimum speed of 60 m.p.h. up the five mile rise from Hatfield to Potters' Bar, *"The Flying Scotsman"* reached King's Cross three minutes early.

On this run the total running time from Edinburgh to London was only three minutes over seven hours, and had the journey been made non-stop it could easily have been completed in that time, giving an average speed for 393 miles of 56.2 miles per hour. We are indebted to Mr. O. S. Nock for these details of *"Victor Wild's"* splendid work.



L.M.S.R. 4-6-0 locomotive No. 5018 about to leave Blair Athol Station. This illustration is a prize-winning photograph by D. F. Forbes, Edinburgh, H.R.C. No. 14092.

Television at Waterloo

The Southern Railway have introduced regular television programmes at Waterloo Station, where the programmes broadcast from Alexandra Palace will be shown in the Waiting Room opposite No. 16 Platform. There will be two shows daily, from 11 a.m. to 12 noon and from 3 p.m. to 4 p.m. respectively, except on Saturdays, and admission is free to railway ticket holders.

Brilliant Running on S.R.

In 1905 Mr. Dugald Drummond, first locomotive engineer of the London and South Western Railway, built some very big four-cylinder 4-6-0 engines with driving wheels of 6 ft. diameter for mixed traffic work. These have gone through several stages of rebuilding, in the last of which, about 15 years ago, they were converted to two-cylinder propulsion; but throughout their career most of them have been stationed at Salisbury for working heavy goods traffic between there and Southampton. In the peak periods they are very frequently called upon for express duties, however, and on a recent occasion No. 333 of this class was provided to work the up *"Atlantic Coast Express"* from Exeter to Salisbury.

As far as Sidmouth Junction the load was one of only 10 coaches, weighing 345 tons gross, and No. 333 made light of it, getting up to 69 m.p.h. as early as Broadclyst and not falling below 39 m.p.h. up the four mile climb at 1 in 100-135 past Whimple. Sidmouth Junction, 12¼ miles, was reached in 17¾ min. instead of the 19 min. allowed. There three more coaches were added, bringing the load up to a total of 450 tons. On the tremendous ascent at 1 in 90 through Honiton speed fell to 22¾ m.p.h., but approaching Seaton Junction 83½ m.p.h. was attained, a remarkable achievement with 6 ft. wheels!

Beyond there speed rose and fell with the usual frequency over this steeply graded switchback, the speeds recorded being 37½ m.p.h. at Hewish, 75 at Crewkerne, 69 at Yeovil, 28 at Milborne Port, 68 at Templecombe, and 29 at Semley. The 52½ miles from Honiton Summit to Semley Summit were run at an average speed of 53 m.p.h., and with a fast descent to Salisbury, with a top speed of 74 m.p.h. at Dinton, the 75.8 miles from Sidmouth Junction were completed in 90¼ min., an average speed of 50.3 m.p.h.

This run was timed by Mr. O. S. Nock.

* * * *

Driver W. Sparshatt, driver of *"The Flying Scotsman"* and *"Silver Jubilee"* trains has retired from the footplate. Among his many notable performances was the maximum speed of 108 m.p.h. attained with an unprepared "Pacific," No. 2750 *"Papyrus."*

New Signal Box at Waterloo

The last stage of the S.R. track and signalling improvement scheme between Waterloo and Surbiton was completed when the new electric signal box at Waterloo Station was opened recently. The first part of the scheme was introduced last May, when the "Fly-over" at Wimbledon and the revised track layout at Waterloo were brought into use, together with the colour-light signalling between Vauxhall and Malden, and in June the colour-light signalling between Malden and Surbiton was completed.

This new box, which is built almost entirely of concrete, stands at the side of the track, in marked contrast to the former existing "A" box, which dominated all the tracks into Waterloo for 44 years. It contains 309 levers, each about 8 in. long, and controls an area that formerly required six signal boxes with a total of 499 levers. Four illuminated track diagrams over the lever frames show when the various sections of track are occupied.

The new box gives control of 44 colour-light signals, 62 floodlit shunting signals, and 34 route indicators, point machines and position light junction indicators. Telephones have been installed at 27 positions, so that drivers can communicate with the signal box when they are detained at a signal, and loud speaker equipment is provided between the box and the down sidings at Waterloo.

The total length of the wire used in the circuits controlled from the signal box is 110 miles, and in addition there are 30 miles of telephone wires.

L.N.E.R. to Build 121 More Locomotives

The L.N.E.R. have this year placed in service no less than 4,802 new wagons, 593 new coaches, and 739 new containers. New locomotives now in service number 56, including the sister engines to *"Cock o' the North."*

During 1937 the L.N.E.R. are to construct 121 new locomotives. These will include 14 "Silver Link" Pacific engines, a further 11 engines of the "Green Arrow" mixed traffic type, and 32 "Sandringhams" for service on main line and secondary passenger trains. In addition 38 freight locomotives, 20 tank engines of the 2-6-2 type, and six shunting engines are to be built.

L.M.S.R. Locomotive News

New engines continue to be delivered from Crewe and Derby, and also from the contractors. At the present time Derby Works are busy on the construction of 2-6-4 tanks, while Crewe Works are turning out Class 5X taper boiler 4-6-0s. Locomotives being delivered from contractors include 4-6-0 mixed traffic engines, 2-8-0 freight engines and 2-6-4 passenger tanks.

Among engines condemned are 4-6-0s Nos. 10451, 10457, 25662, *"Anzac,"* 25675, *"Sphinx,"* 25708, 25784, 25830, 25843 and 25844, in addition to Nos. 5284, *"Ambassador,"* 5315, *"Delamere,"* 5379, *"Woodcock"* and 25299, *"Vesuvius,"* and No. 14327, all 4-4-0s. No. 12479, the sole survivor of the former Furness Railway 0-6-0 goods class, has now been withdrawn from service.

Passenger tank engines to be condemned include 4-6-2 No. 6974, 4-4-2 No. 6827, 0-6-4 No. 2036, and the two engines, 4-4-0 No. 15028 and 0-4-4 No. 1376.

The up South Coast "Daylight Express" leaving Kiama, New South Wales. This photograph secured a prize for R. B. McMillan, Melbourne, H.R.C. No. 9592, in a recent Photographic Contest.

S.R. and G.W.R. Station Improvements

The S.R. are carrying out extensive alterations to Richmond Station. Both the "up" and "down" platforms are being lengthened, and the platforms serving the "district" trains of the L.P.T.B. also are being extended. A new footbridge will connect all platforms, and a car park with accommodation for 45 cars will be provided. The scheme entails the re-modelling of the goods yard and the construction of a new goods shed.

A scheme announced by the G.W.R. provides for the complete rebuilding and enlargement of the existing Station buildings at Leamington Spa. Longer and wider platforms are to be built and the two existing main and bay line platforms will be raised to the standard height.

The "up" main line platform will be 650 ft. in length, 360 ft. of which will be under cover. The "down" main line platform will be 23 ft. longer and will have a covered length of 480 ft.

New and old forms of road transport side by side at York Station. Prize-winning photograph by H. W. West, Newport, Mon., H.R.C. No. 99.

King's Cross to Edinburgh in Six Hours

In July next year the L.N.E.R. are to introduce a new streamlined train between King's Cross and Edinburgh that will cover the 393 miles in 6 hrs., a reduction of 1 hr. 15 min. on the time now taken by *"The Flying Scotsman,"* at present the fastest train making this journey. The average speed of the new train will be 66 m.p.h., and this will be the highest ever maintained over such a distance in this country.

By permission of the King, the new train will be named *"Coronation."* It will be additional to the present services, and will make only one stop, at Newcastle.

Another new train with an average speed of 68 m.p.h. is to be inaugurated by the L.N.E.R. between London and Leeds. It will be timed to cover the distance of 186 miles in 2 hrs. 45 min., or 25 min. less than the present best time of 3 hrs. 10 min.

Streamlining on Canadian Pacific Railroad

The Canadian Pacific Railroad have introduced four new lightweight semi-streamlined trains, three of which are now in service between Montreal and Quebec, Toronto and Detroit, and Calgary and Edmonton respectively.

The new trains are hauled by 4-4-4 streamlined engines of the "Jubilee" class, which are said to be capable of 110 m.p.h. The boiler pressure of these locomotives is 300 lb. per sq. in. and their driving wheels are 6 ft. 8 in. in diameter. The total weight of engine and tender is 191 tons, of which 80 tons is the weight of the tender. A noteworthy feature is that with the exception of the drivers, all the wheels run on roller bearings.

Caprotti Valve Gear for L.N.E.R. Locomotives

The L.N.E.R. are to fit two further B3 4-6-0 passenger engines with Caprotti valve gear. The class to which these engines belong was introduced by the Great Central Railway for express passenger train services and is popularly known as the "Lord Faringdon" class. Two of these engines were fitted with this valve gear eight years ago and they have since given excellent service, running an average of 53,000 miles a year. The decision to equip a further two engines has been prompted by the satisfactory saving in coal consumption.

Manchester-Sheffield Electrification

The electrification of the main line between Manchester (London Road) and Sheffield will probably be commenced at an early date. When the scheme is completed the average speed of passenger trains will be increased from 40 m.p.h. to 50 m.p.h., while that of the electric goods trains will be increased to 40 m.p.h. The overhead power system will be employed and 88 electric locomotives are to be built.

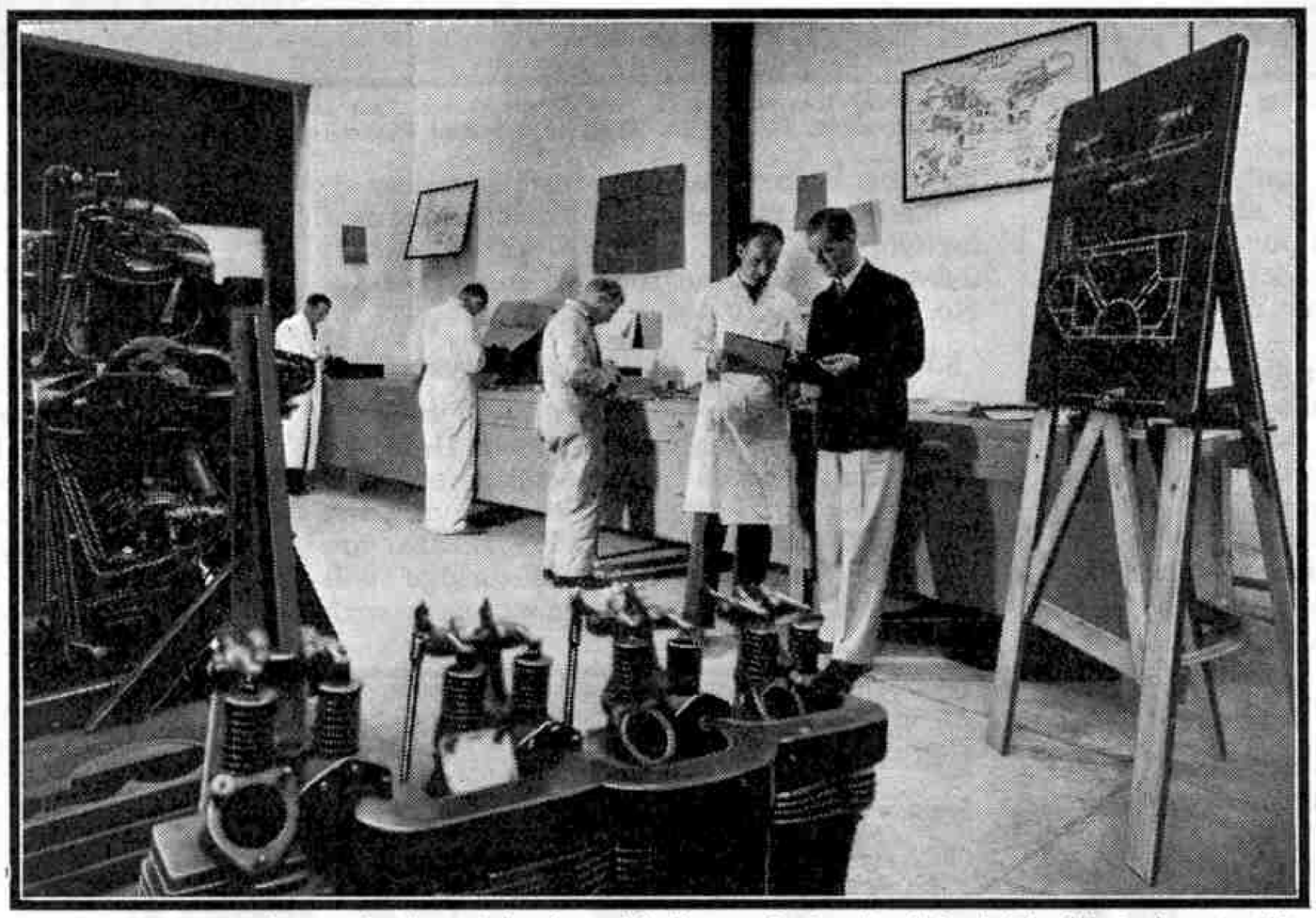
Airmen Return to School

"Finishing Classes" for Empire Flying Boat Crews

ON the fringe of the great London airport at Croydon one finds a very remarkable "school" in operation. Looking out from its windows, you see big air liners arriving or departing at the neighbouring airport; while a glance round the class-rooms of this "school" shows you a number of keen-eyed, athletic-looking young men, sitting at desks listening to lectures, or carrying out tests with wireless or other technical equipment. These young men who have temporarily gone back to school are aeroplane pilots. No novices, these. All of them are qualified airmen, holding their official licences as commercial pilots. And all of them have spent long periods up in the air.

Why, then, have they gone back to school?

The answer is that these young aviators—all of them picked men—are in special training for air work of a kind more onerous and exacting than any they have undertaken hitherto. They are to form the crews of the great new fleet of Imperial Airways flying boats—28 in number—with which next year the amplified mail scheme is to be inaugurated whereby letters in bulk, without any form of flying surcharge, are to be air-borne between England and distant parts of the Empire.



Airmen studying engine mechanism at the Imperial Airways Instruction School. The illustrations to this article are by courtesy of Imperial Airways Ltd.

As air liners grow bigger and bigger, the crews who handle them have to become correspondingly more expert. Seventeen years ago, when civil flying began, all that pilots were called upon to fly were tiny two-passenger machines, driven by single engines developing about 360 horse-power. There was no wireless equipment in commercial aircraft in those days. Scientific aerial navigation, with its many instruments, had not yet been introduced upon the airways; and commercial night-flying had still to come. Everything was primitive—in its earliest infancy.

And now see the difference between those days and the present time. In contrast to the small low-powered machines of 1919, our new Empire flying boats will be driven by four powerful motors developing a total of 3,000 horse-power. They will carry three tons of mails; their big passenger saloons will be equipped with sleeping-berths as well as with day accommodation; and when fully-loaded they will weigh just on 18 tons. Real "liners of the air," these great new craft! By night as well as day they will devour distance across the Empire, being capable of speeds of just on 200 miles an hour.

The men who handle these new clippers of the clouds will need, in addition to their work as pilots, to be experts in all questions affecting wireless and aerial navigation; while they will need also to be fully qualified in such matters as ground engineering, maintenance, and overhaul. This explains the existence of the "school" which Imperial Airways are operating. It is, in effect, a "finishing school" for pilots—a school in which experts impart to these young airmen all the scientific and technical knowledge that now appertains to commercial flying in bad weather as well as in fine, and in the hours of darkness as well as by day.

It is really two kinds of navigation that these young airmen of Empire have to master. They have to learn to handle and steer their great flying boats through the air, and they have also to learn to manœuvre them on the surface of harbours or rivers, and to bring them up to their moorings like ships of the sea. This means learning all about tides and currents, and the movements of surface craft in busy ports. They need, in fact, to be seamen as well as airmen—these young pilots who will be flying our new marine aircraft along the main trans-Empire routes.

Lessons in the class-rooms at the "finishing school" are varied by a great deal of practical and experimental work in workshops and test-rooms. Pupils go across to the machine-shops at the airport and gain practical insight into all the modern phases of air-liner maintenance and overhaul. They have completely-equipped wireless installations at their disposal. With these they can, as required, reproduce the conditions of actual flying, exchanging routine signals and experimenting in direction and position-finding. They are also able to listen-in to the day-to-day wireless signalling that is in progress between the control tower at Croydon and air liners actually in flight on the Continental routes. Another change from the lecture rooms takes place when pilots go down to Hamble, near Southampton, for practical instruction in the handling of big, multi-engined flying boats.

It is astonishing, when one visits this pilots' school, to find how varied and extensive is the knowledge that must be acquired by a modern air-line "skipper." Meteorology, of course, is an important subject. The pilot must learn all he can about the mysteries of that ocean of the air through which he will be navigating. He has to learn to read and interpret weather maps; to follow the movement of

low-pressure systems and of anti-cyclones and cloud formation; to grasp immediately the significance of the wireless weather reports that will be at his disposal not only when he is on the ground, but which also will be flashed to him when he is passing high through the air.

One of the courses of lectures to which the pilots listen deals with the very intricate subject of international air legislation. Commercial air liners have not yet a freedom of the air corresponding to the freedom of the sea granted to the world's mercantile marine. Each nation claims complete sovereignty of the air above its territory, with the result that the operation of long-distance international air lines becomes a matter of delicate negotiations and reciprocal agreements, with many restrictions in regard to prohibited areas and adherence to specified corridors when passing above certain territory. With all such matters of international air law, as it exists at the present time, the air-line pilot must acquaint himself thoroughly.

An airman schoolmaster explaining to future crews of Imperial Airways air liners how a course is set. He is using a compass and a wooden outline of an aeroplane in making his meaning clear.

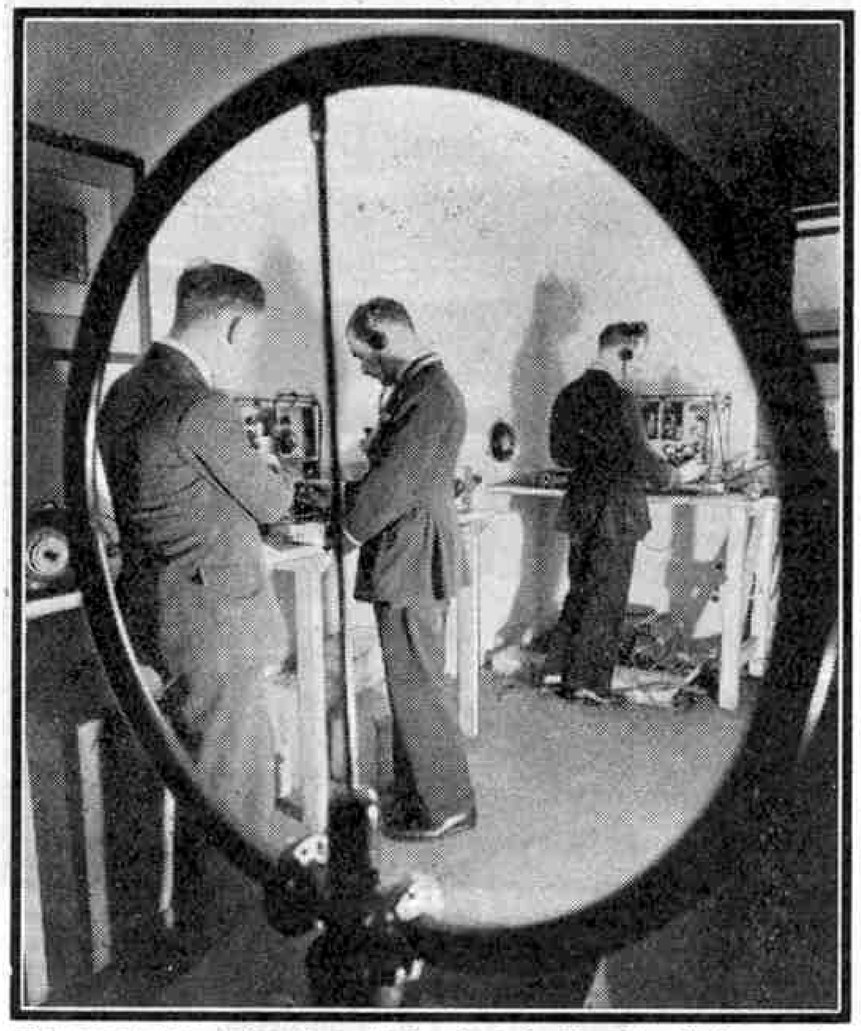
Another big and important subject is that of regular commercial night-flying. Chains of aerodromes along the Empire routes are now to be equipped with the latest types of floodlights and other illuminations. Intermediate airway beacons, each flashing skyward its identifying signal, are being established along the main long-distance routes. Special illuminated wind-indicators, telling a pilot the strength and direction of the wind as he glides down to make a night landing, are also being placed on main and intermediate alighting-grounds. It is a special technique that is growing up in connection with commercial night-flying, and with every phase of this new aspect of his art the air captain must acquaint himself.

Then he has to make a study of course and distance calculations, and of the whole theory of aeronautics. He has to become familiar with aircraft compasses, and with "homing" devices that guide him to airports. He has to make a study of aero engines, and of their methods of construction, operation, maintenance, and overhaul. He needs to know all about the control systems of the air liners he will pilot.

It takes a pilot from 12 to 15 months to pass through all the various classes at this aerial finishing school. By the time he has absorbed all the specialised instruction that is imparted to him he is not only an expert in handling big modern aircraft, but he has obtained also a knowledge of navigation, meteorology, wireless, and airway engineering that will prove invaluable to him in his work as an air-line skipper on the great trunk routes that now connect the Homeland with distant parts of the Empire. Britain's great mercantile marine, with its captains who rove the world, has created for itself a splendid tradition of service and of technical skill; and it is the determination of our young flying skippers to build up just as fine a reputation and tradition for the British mercantile air service.

Apart from air captains and first-officers, the amplified Empire air-mail scheme is calling for increases in the highly skilled wireless staffs. In addition, therefore, to the pilots who are entering the service of Imperial Airways, specially chosen wireless operators are being drafted from the marine service to that of the air, and in the airway school are being given the additional coaching necessary to enable them to pass their examinations for obtaining—as air-liner wireless men—the aviation equivalent of the official certificate held by ocean-liner operators.

From the earliest days of civil aviation, when the first experiments were being made with wireless telephony between aeroplanes and ground stations, wireless has played a vital part in the operation of commercial air services. From pioneer stations operating on the continental routes, the wireless network has grown until it now stretches link by link from England to Egypt, Africa, and India, and on thousands of miles to China and Australia.



This novel view, taken through the ring of a direction-finding aerial, shows airmen at the School studying wireless installations.

As a part of the improved ground organisation for the big new Empire air scheme, many developments and improvements are taking place in wireless communication. Throughout the Empire air lines approximately 40 new wireless stations are being established; while both on the ground and in the air the equipment will embody the latest devices evolved by scientists and technicians. The wireless installations now being fitted in the new Empire flying boats are, it is claimed, the most modern and efficient ever constructed for use in commercial aircraft. One feature of these improved installations is that a direction-finding apparatus is embodied in the main set, and is not a separate piece of equipment as has been the case hitherto. By the use of this direction-finding equipment the wireless operator will be able to tune-in to ships or shore stations, and plot out the air-liner's position at any time during a flight. He will be in constant touch with one or other of a chain of ground stations, and thus will be able to obtain the latest information as to weather conditions ahead.

For the information in this article we are indebted to Imperial Airways Ltd.

Waterwheel Alternators for New Zealand

The photograph on this page shows the stator of one of two giant waterwheel alternators built by the Metropolitan-Vickers Electrical Company for the Arapuni power station in New Zealand. The alternators are rated at 24,000 kVA, 11,000 volts, and are believed to be the largest electrical machines of which construction has yet been undertaken by British manufacturers.

The yoke, or outer frame, is just over 26 ft. in diameter and weighs nearly 18 tons. It is of welded steel construction and to facilitate transport was made in four sections, with special arrangements to ensure that when the sections were assembled they would fit into exactly circular form without any packing.

The core is of laminated electrical steel and also was assembled in four sections, so that the stator when wound and completed could be divided for shipping, the coils spanning the joints being removed for this purpose. The total weight of copper in the stator winding of each machine is nearly five tons.

The Arapuni power station, in which these generators will be installed, is one of the three main power stations in the North Island of New Zealand. Its output is supplied principally to the city of Auckland, but a considerable amount of energy is also supplied to other towns and to farms in the northern area. In addition the station is connected by a 110,000 volt transmission system with the Waikaremoana Power Station, in the east of North Island, and the Mangahao Power Station in the south.

A Boat for Use on London's Reservoirs

The Metropolitan Water Board have acquired an unusual type of boat for use in distributing chemicals required in treating the water in certain London reservoirs. The boat is in the form of a punt 20 ft. in length and 7 ft. in beam, and is driven by a 12 h.p. four-cylinder internal combustion engine. It has a maximum speed of between 6 and 7 m.p.h., but as it is sometimes necessary to travel very slowly, a variable-pitch propeller is fitted by means of which the speed can be reduced to one mile per hour. At the bow and stern are conveyors operated by electric motors obtaining current from a dynamo driven from the main engine. The conveyors are supplied with the necessary chemicals from hoppers situated in the centre of the boat, and these are fed into the water as the boat travels along.

The boat will be used on several London reservoirs, and a special trailer carriage has been provided for transporting it from place to place as required.

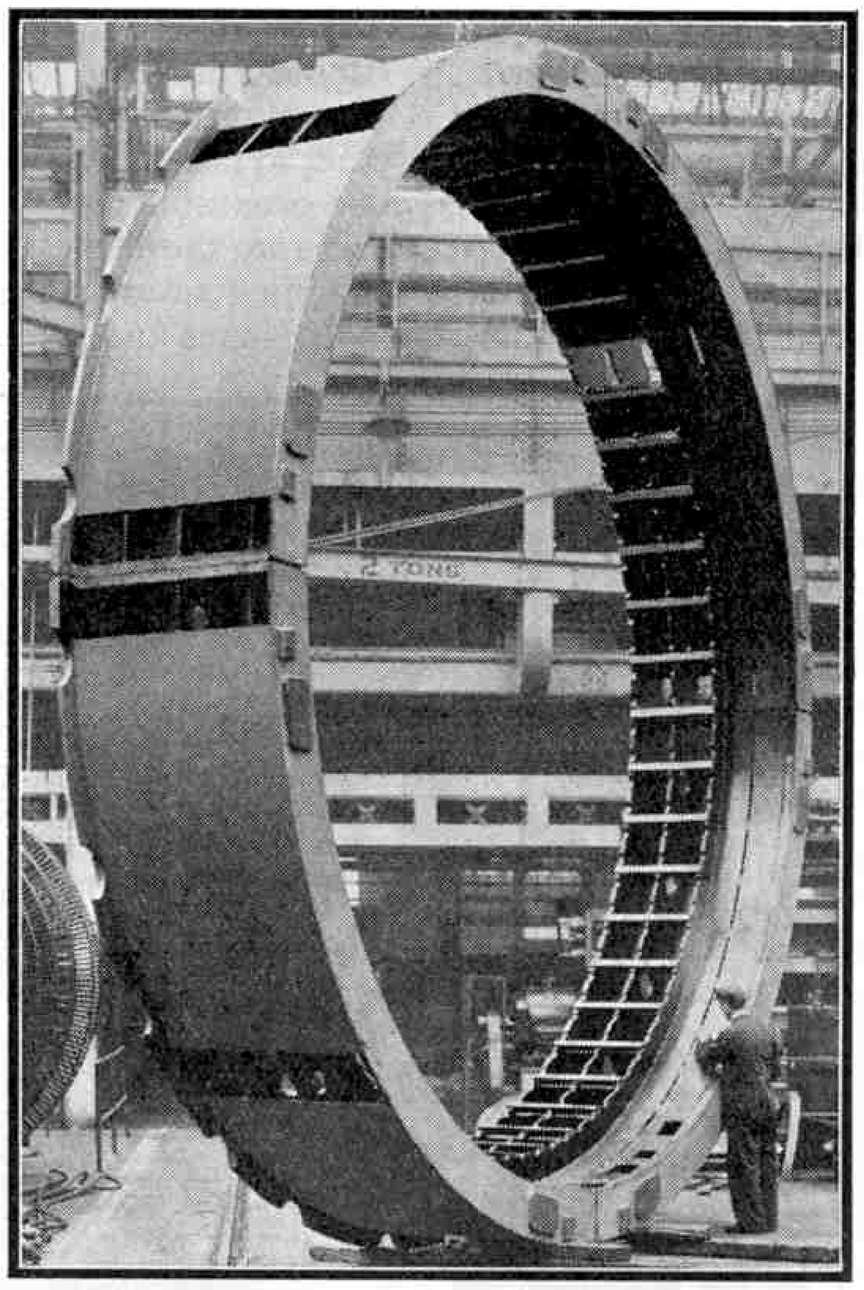
A Post Office on Wheels

In order to facilitate communication to and from important sporting events in various parts of the country the Postmaster General has introduced a special mobile post office. The vehicle consists of a Morris-Commercial tractor unit, which hauls a Kwikfiks semi-trailer attachment that is fitted with a Duple body 22 ft. long and 7 ft. 6 in. wide. The body is divided into three compartments. At the rear are two telephone call offices provided with folding doors, and in the centre, which is the main business compartment, there is a desk for three postal clerks and a teleprinter machine for telegrams. Telegrams are dispatched and accepted, telephone calls made, stamps sold and letters and parcels received and registered. An external writing ledge is provided on one side for the convenience of customers, who when transacting business are sheltered by a collapsible awning.

At the front of the body is a compartment for storing equipment, including duck boards, which are laid around the vehicle when it is working in fields. On the off side, behind the serving windows, are automatic stamp machines and a letter chute, which leads to a mail bag inside the vehicle.

In order that the staff may carry out their duties in conditions as near normal as possible, the drawer and shelf accommodation usually provided in ordinary post offices has been installed.

Electric current for operating the equipment is provided by a generator driven from the gear box.



The stator for one of two 24,000 kVA, 11,000 volt alternators, for a large power station in New Zealand. These alternators are believed to be the largest yet built by British manufacturers. Photograph reproduced by courtesy of Metropolitan-Vickers Electrical Co. Ltd., Manchester.

Electricity at the Zoo

Reptile dens and crocodile pools floodlighted and heated by electricity are now a feature of the London Zoo. In the reptile house 75 large dens and 27 small dens are treated in this way, and in some of them tubular electric heaters are concealed in the rocks to provide properly warmed resting places for the inmates.

In each of the large dens eight 1,000 W circular reflector heaters are fitted above the front windows, and these maintain a temperature of between 75 and 80 deg. F. The water in the pools is kept at 70 deg. F. by eight 250 W thermostatically controlled heaters, and as a substitute for sunshine on dull days eight 300 W tungsten lamps are fitted near the roof. These are provided with special glass that permits the passage of ultra-violet rays. If the temperature in any den rises above the required figure, a red lamp is illuminated in the keeper's room, and a green light shows if the temperature falls too low. A bell in the curator's office also gives warning of undesirable changes in temperature.

World's Highest Turntable Fire Escape

What is believed to be the highest turntable fire escape in the world is now in the service of the Hull City Police Fire Brigade. When fully extended the escape reaches to a height of 150 ft. Power for travelling and for extending the ladder is provided by a 115 h.p. engine, which gives a road speed of 50 m.p.h.

When the ladder is to be extended the road springs are locked by the operation of levers, and four quick-acting jacks are then drawn out of the chassis and extended. The jacks are mounted on the ends of cantilever arms and project well beyond the rear wheels to provide a wide and steady base. The ladder is in six lengths and is extended and withdrawn by means of wire ropes and winding gear. The full extension can be made within half a minute of the arrival of the machine at the scene of a fire.

The escape was made by Leyland Motors Ltd., and all the controls are centralised to enable one man to operate it.

A Giant Oil Tanker

On page 315 of the June 1936 issue of the "*M.M.*" we described and illustrated the chassis of a giant tank lorry that has been built for carrying oil from the Iranian oil fields for distribution in Teheran. The lorry is now in service, and the upper illustration on this page shows the vehicle in its finished state. It was built by Straussler Mechanization Ltd., of London, and has an overall length of 25 ft. 10 in. and a weight of 12 tons. It is fitted with a Straussler V-eight engine that develops 150 b.h.p., and each of its eight road wheels is independently mounted to provide the flexibility necessary for travelling over uneven desert surfaces and rough mountain roads.

Flexibly mounted road wheels to facilitate passage over rough surfaces are an important feature of this giant petrol tank lorry, which has been built for service in the Iranian Oilfields. Photograph by courtesy of Straussler Mechanization Ltd.

Camera that Photographs Lightning

In order to obtain information regarding lightning and its effects a special observatory has been built at Pittsfield in the United States of America. It is equipped with a periscope and a high-speed camera that has a range of 20 miles.

The outside of the structure is coated with aluminium paint and the inside with black. It is 14 ft. in diameter and in the centre of it is the periscope, which is topped by a crystal sphere. Lightning flashing in any direction is reflected in the silvery surface of the roof, and thence in the crystal, from which it is reflected to the eyepiece of the periscope by a mirror set at an angle in its dark-walled tube. The camera is placed underneath the periscope platform, and is provided with a moving strip of film and 12 lenses, which are so arranged that it is possible to record lightning discharges occurring at all points round the observatory.

As the instrument is exposed to the weather when in use, adequate protection against the rain had to be provided for the lenses. This is accomplished by surrounding the camera with a curtain of compressed air, which issues from a perforated ring placed above the camera. The air curtain shuts out all but the heaviest downpours.

A New Use for Cellophane

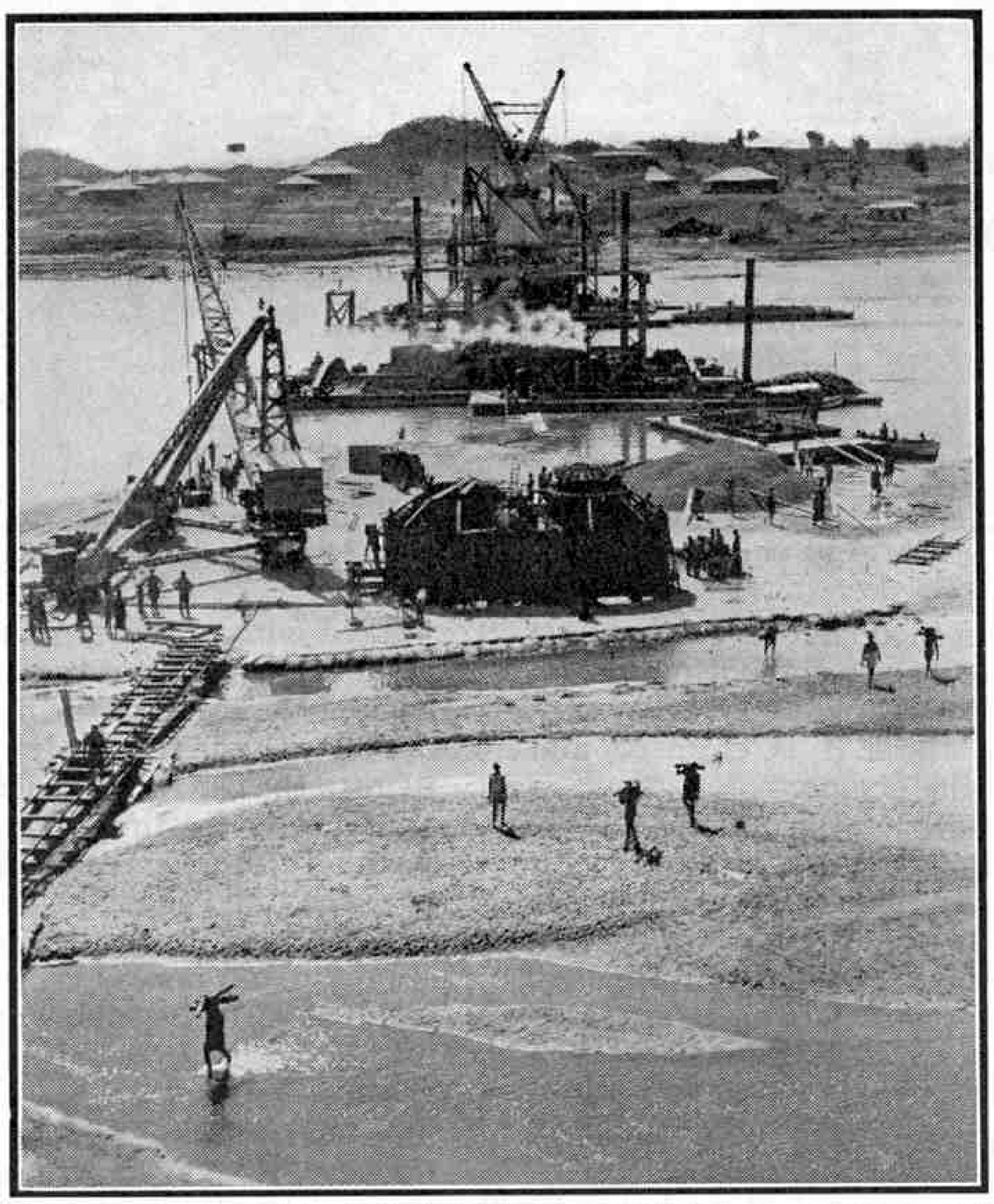
Cellophane is now being used to insulate the windings of electric motors. The material used for this purpose is in the form of ribbon from 1/32 in. to ¼ in. in width, and is so thin that the assembly takes up much less space than is required when other insulators are employed. The ribbon is wound round the wire by means of ingenious machines working at very high speed, and a special adhesive holds the turns in place.

A further advantage possessed by cellophane is that it resists high temperatures better than other insulating materials, and it is said also to dissipate the heat generated in the windings more quickly.

German Island Joined to the Mainland

The island of Ruegen, in the Baltic Sea, which is famous for its holiday resorts and bathing beaches, has now been joined to the mainland of Germany. The connection is formed by a dam 1½ miles in length from the city of Stralsund to a small island, the final link being a bridge of nine spans covering the final 550 yards. Part of the bridge is hinged, and can be raised to allow the passage of ships.

A road and a railway have been built on the dam, which has cost about £2,575,000, and besides giving easy access to Ruegen, the new works will shorten the journey from Berlin to Sweden by about two hours.



Sinking concrete foundations in the bed of the Zambesi River to support the piers of the world's longest railway bridge that is continuously over the water. The bridge was fully described in the "M.M." for July 1936.

Sark to have New Harbour

Sark, one of the Channel Islands and well-known to holiday makers, is to have a new harbour. At present the only landing place is at Le Creux. It is reached through a narrow opening between the sea walls, but in rough weather channel ships are unable to negotiate the passage and passengers are landed by means of tenders.

It is expected that the new harbour will cost about £45 000. It is hoped that this capital outlay will be amply repaid by harbour dues, and that an increased number of visitors will be attracted to the island.

A Great Hydro-Electric Scheme

A further stage towards completion of the great Cauvery-Mettur irrigation and hydro-electric scheme in India was reached recently when the foundation stone of the power house was laid. The Cauvery-Mettur project provides for the irrigation of 1,000,000 acres of existing rice fields in the delta of the Cauvery River, and of over 300,000 acres of new plantations. It has involved the construction of a great dam just over a mile in length, which has created a huge reservoir with a storage capacity of 93,000 cu. ft. behind it. The building of the dam was fully described in the "*M.M.*" for August 1934. In addition to supplying water for irrigation purposes this reservoir will also provide water power for driving huge turbines in the new power station that is now being constructed, and which when completed will supply electric current over an area of 25,000 square miles, with a population of 12,000,000.

The power-house, a steel-framed structure, will be situated at the foot of the dam on the left bank of the Cauvery River, and the equipment will include three great turbines, each capable of generating 15,000 h.p. The transmission and distribution lines radiating from the station together will be nearly 900 miles long.

A New B.B.C. Transmitter

In order to provide a satisfactory radio service for listeners in the north of Scotland, the British Broadcasting Corporation have put into commission a new transmitting plant at Burghhead on the coast of the Moray Firth. The new station is designed on similar lines to the North Ireland Regional Station, and is provided with a 500 ft. single mast antifading aerial. The normal power supply is taken from the mains of the Grampian Electricity Supply Company, and the power delivered to the aerial is 60 kW. The new station transmits on a wavelength of 391.1 metres, which is the same as that of the Scottish Regional transmitter at Westerglen, to which it is tuned and linked by a land-line.

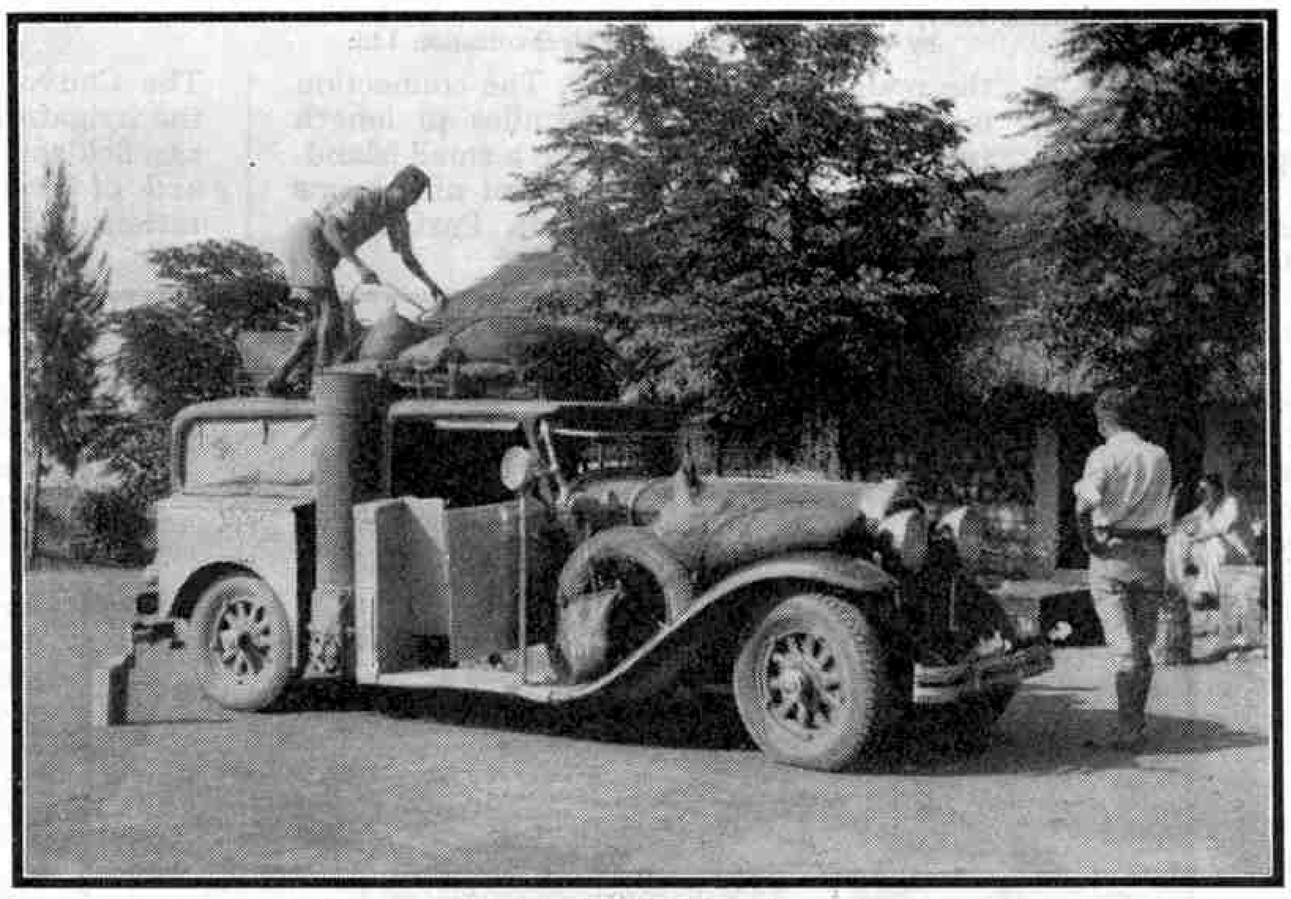
From Kenya to Rhodesia by Car

An Adventurous Tour in Tropical Africa

By S. T. R. Hemsted

VERY few people have made the journey from Nairobi, Kenya Colony, to the Victoria Falls in an ordinary car using petrol; so it was no wonder that we were laughed at when we said we were going to the Victoria Falls and back in under five weeks in one that depended for its motive power on charcoal! With but little preparation we set out full of optimism to spend our Christmas holidays at the Falls, however, intending to be back in Kenya sometime in the third week of January. The distance from Nairobi to the Falls is about 4,200 miles, and on the way there are only about 1,000 miles of road that can be described as fit for "all weather" use.

Our eventful journey was made in a Buick of high horse power that is ideally suited for conversion into a "charcoal burner." The additional apparatus fitted to it for this purpose consists of two large tanks, one at each side of the car on the running board. The off-side tank produces the gas. It is first filled with good quality charcoal, and in its base a fire is lighted, the draught being provided by the suction of the engine, which has first to be started on petrol. A small quantity of water is allowed to drip continuously on the burning charcoal. This forms carbon monoxide, a combustible gas, which is passed through a pipe to the bottom of the near side tank. There it rises through many layers of sisal tow, and in passing through these it is cleansed and made ready to pass direct to the engine.



Making ready for the adventurous journey described in this article. The car runs on gas produced by allowing water to drip on burning charcoal.

The gas enters the cylinders through the ordinary induction pipe, and it is important that it should be mixed with the right quantity of air. The amount of this supplied is controlled by a wheel on the dashboard, which opens and shuts a valve on the induction pipe. The better the quality of the charcoal, the greater the quantity of air required. If the charcoal is good and running conditions are favourable, one could not wish for a better form of locomotion, but in bad conditions the apparatus can be the most trying in the world.

We set out with an enormous load, which included 16 bags of charcoal. In addition we had three tents and food for four weeks, together with tools, cameras and other baggage. We also took with us a native boy, whose chief task was to keep the charcoal burning apparatus clean, for the whole arrangement has to be cleaned thoroughly every day to maintain it in good running order, and this is a very dirty job.

We left Nairobi at dusk with the fire going well, and decided to make a night run to Arusha, in Tanganyika. We had gone scarcely 30 miles when we ran into thick mist and mud. The heavy car got hopelessly stuck, and our first night was spent in freezing cold, although we were almost on the Equator, for we were at an altitude of over 8,000 ft. We spent a horrible night trying to free the car, and did so only after 18 hours' hard work, in which we wasted three bags of our precious charcoal, spread on the road in order to give the wheels sufficient grip. Then the furnace was started and we went as far as Kajiado, in the centre of the Kenya Game Reserve, where we made a really first-class camp in a beautiful spot.

Next day we had an uneventful run to Arusha, with snow-capped Kilimanjaro towering above us. At Arusha we were eyed with curiosity and disapproval, as on the way to the Police Station we sunk right through a culvert. We had to unload everything, and the help of the majority of the inhabitants was necessary before the car was extricated.

We were already considerably behind schedule, and decided to make a night run to Dodoma, the next important centre on our route. We worked out a special organisation for long runs involving night driving. One of the party slept as best he could in the back of the car with the native and luggage, while another drove, with the third helping him. Two men were necessary to keep the car running. One was in charge of the charcoal apparatus, adjusting the supply of water to meet the varying road conditions or to allow for differences in the quality of the gas, and changing over to petrol when this was needed. The other drove the car, a task that required considerable skill and nerve over new country. If we went down a long hill with the engine acting as a brake in the ordinary manner, then we had no gas left at the bottom. This would cause considerable delay, as it was some time before the fire could be re-lighted and the car could be put into running condition again. Our usual procedure in these circumstances therefore was to put the gear lever in neutral, and advance the hand throttle so that the engine was roaring. The car would then free-wheel down the hill with the fire burning well, while the driver had to rely entirely for control on the brakes.

Travelling in this manner over the so-called Cape to Cairo Road at night was in many places beyond a joke. The fire would cast an uncanny glow on the opposite bank, and

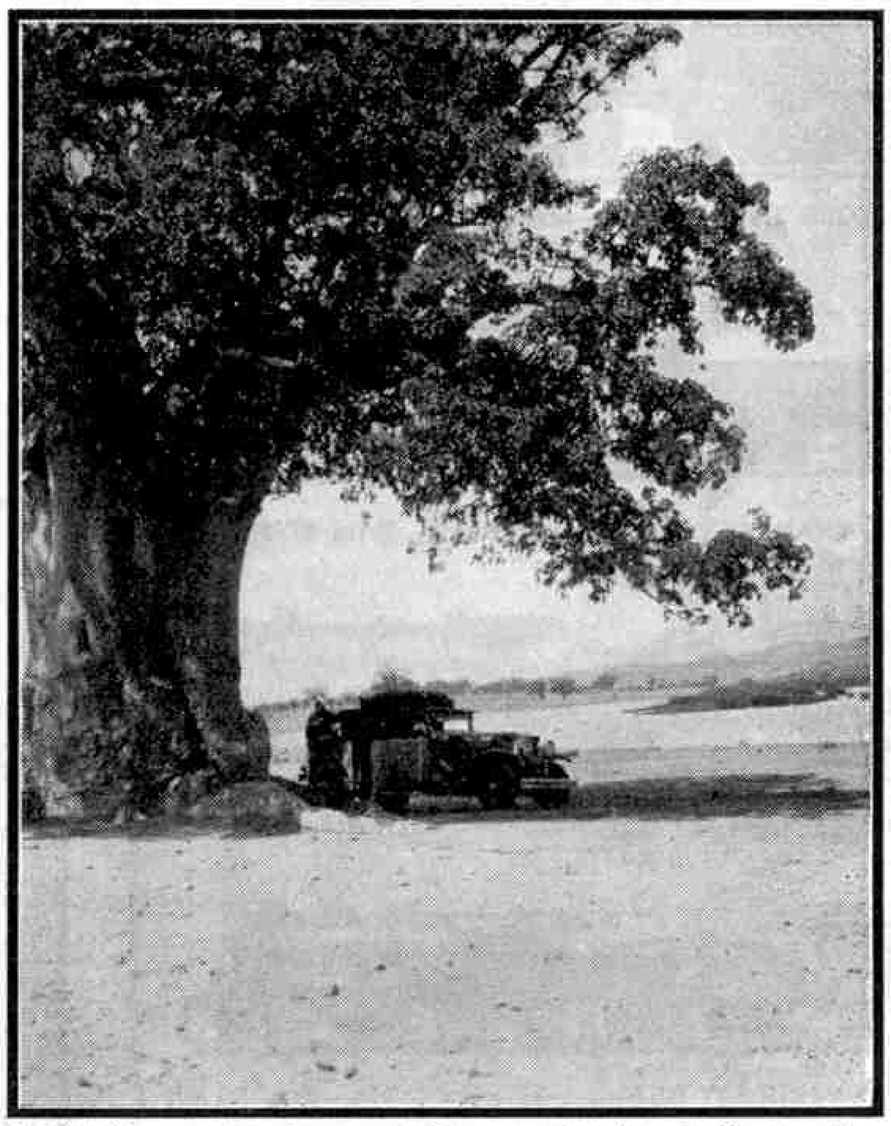
natives who saw us dashed away in fright into the bush. Often the fire would blow out enormous cinders and sparks, causing even greater panic. As each bag of charcoal was burnt, after a run of about 70 miles, we all changed round and began another shift. About midnight we usually stopped to light an enormous fire, which was often placed in the middle of the road, and to enjoy a good meal.

At Dodoma we bought more fuel, and also cleaned the whole apparatus, a task that was exceedingly tiring in the heat. The road from there through Tanganyika is wonderful, yet passes through districts that must be among the loneliest in tropical Africa. For mile after mile we scarcely saw a soul, black or white, until we arrived near Iringa, a small town situated in the Central Highlands.

A section of the main Capetown to Cairo road that is typical of a stretch 400 miles in length. In other parts the road is strewn with debris in the rainy season.

The next few days, including Christmas Day itself, passed uneventfully, except for terrific tropical thunderstorms, and the fact that we left the very good road behind us as we crossed into Northern Rhodesia. We were then making for Abercorn, the capital of this territory, and to reach it took three more days of travel through the pouring rain. The water soaked our charcoal, and it was only with very great difficulty that we could get the car to go at all. This is not surprising, for in effect we were trying to run the engine on steam. We dared not use our spare two gallons of petrol, which we kept in reserve in a small tank on the roof, for that was required for starting or when going through thick mud; and when at length we drifted into Abercorn, we found the town more or less deserted and even the hotel was closing down.

We were now very much behind time, and therefore decided to try another night run. This led to disaster. We left Abercorn in the evening, and after using up our first two bags of charcoal, we were still driving over very bad road in a thick forest. Soon after midnight we took a wrong track in the dark and found ourselves going down a very steep hill. Suddenly we realised that there was a river at the bottom, and to our horror saw that there was no bridge. We just managed to stop the car by running it into a ditch at the side, where it tilted over on its side at a very steep angle. Then came a violent explosion, and in a few seconds the roof and off side of the car were ablaze, and burning fiercely. The angle at which our car was perched had caused our precious reserve of petrol to flow out of its tank, down the side of the car and into the furnace.



A halt for a rest under a magnificent baobab tree in Tanganyika.

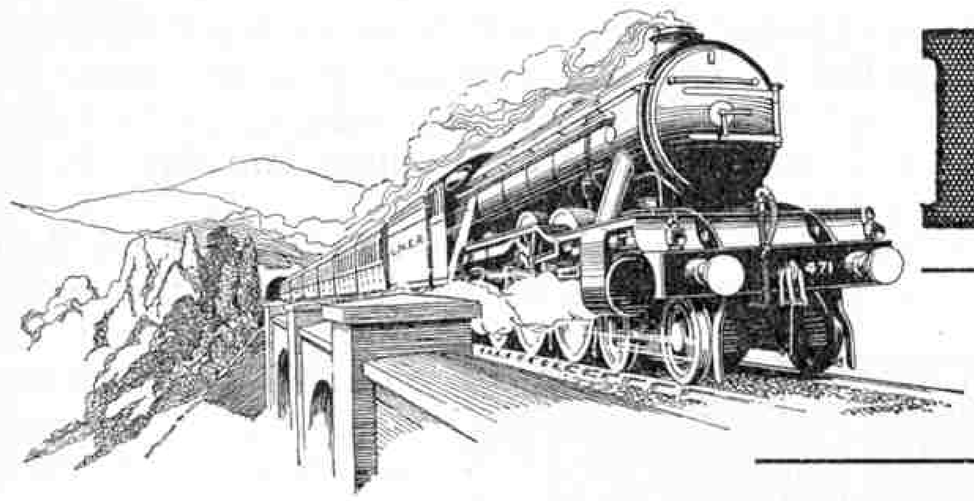
Fighting the fire in the darkness was a terrible task, but by smothering it with earth from the track we eventually quelled it. Our side curtains, mosquito nets, one suitcase and two rugs had been burned irretrievably, and it took us the whole of the next two days to get the car going again.

Two days later we were faced with another problem. Our charcoal was ruined by the rain, and the engine simply would not run on it. We could not buy more fuel, so the only thing we could do was to sit down and make it. None of us knew anything about its manufacture, and we had nothing but a spade, a pocket knife, and a panga, or long native knife, with which to set to work. Something had to be done, however, so we collected an enormous pile of wood and made a roaring fire. Out of this we picked likely-looking embers and ash by hand, and tried to induce the engine to run on this, but nothing on earth would persuade it to do so.

We next dug a pit and filled it with wood, which we kept burning steadily all through the night. Next morning we found a considerable quantity of good charcoal in the bottom of the pit. To our delight, the car went quite well on this, but it took us over seven days to cut down and collect the wood to make eight bags of charcoal.

This was the finish as far as I was concerned, for by this time it was essential for me to get back to Kenya. We therefore made for Mpika Aerodrome, on the main Imperial Air Route. There I booked a seat on the Atalanta aeroplane flying north, and in it reached Nairobi in one day. By road we had taken over five weeks to complete the same journey in the opposite direction.

My two companions and the native boy from Kenya were determined to complete their adventurous journey, and went on to Victoria Falls and Bulawayo. They then crossed into Portuguese East Africa and travelled north through Nyasaland. There they came upon the main road in the wet season, and in one part of it they took over 30 days to cover a distance of only 60 miles. Their difficulties were many and varied. Bridges were down and new ones had to be made to enable the car to cross; the grass grew so high on the side of the road that they could not see above it, and they were nearly bitten to death by mosquitos. Their food and money came to an end, and practically their only food for three months was mahinde, or maize, for which they depended on the generosity of the natives. When at length they arrived back in Kenya, they had taken more than seven months on their tour.



HORNBY ELECT AN CLOCKW

Boys! they're jus

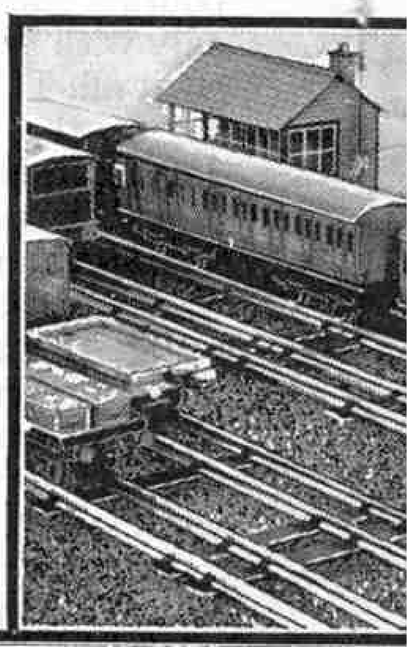
Hornby Trains—the name spells magic to thousands of boys of all ages. It means miniature railways for every home; railways complete with all types of locomotives, coaches and wagons, stations, signals, and all the accessories that make a real railway so full of interest. If the house electric lighting supply is alternating current the whole railway can be operated electrically. The latest Hornby 20-volt electric locomotives fitted with automatic reverse can be started, stopped, controlled for speed and reversed entirely from the side of the track without any manipulation by hand from the cab. To add a final touch of realism, many of the

Hornby Train Sets are available at prices ranging **4/11** to **65/–** for Clo

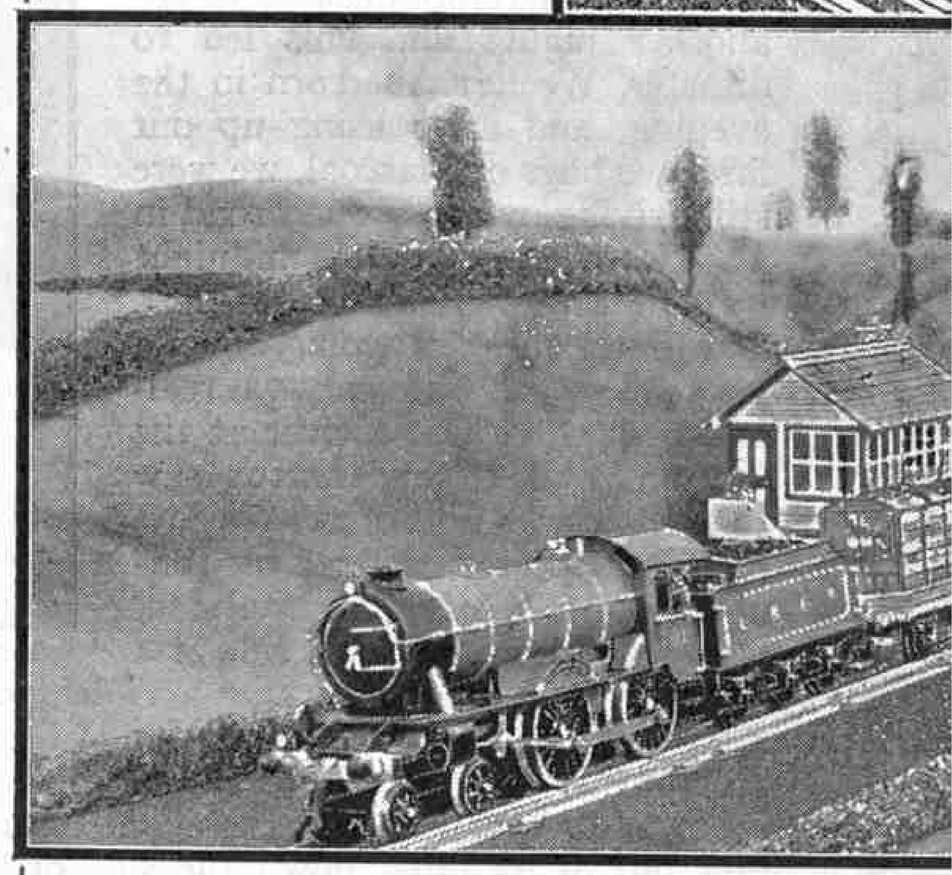
A selection from HORNBY LOC

ELECTRIC MODELS

EM120 (20-volt) or EM16 (6-volt) Locomotive (non-reversing)	Price **8/6**
EO20 (20-volt) Locomotive (reversing) ...	,, **22/-**
E120 (20-volt) Tank Locomotive (reversing) ...	,, **24/-**
E120 (20-volt) Special Tank Locomotive (automatic reversing)	,, **30/-**
E220 (20-volt) Special Tank Locomotive (automatic reversing)	,, **32/6**



You can run this train for yourselves, boys! Just think of the fine fun you could have with a train like this. The locomotive is the popular Hornby No. 2 Special Tank drawing two No. 2 Brake Third Coaches.



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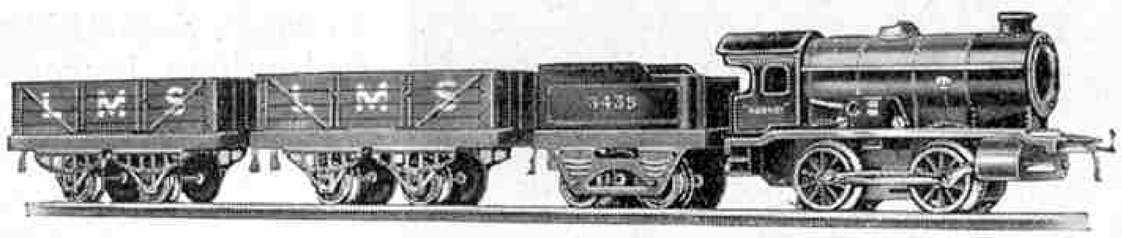
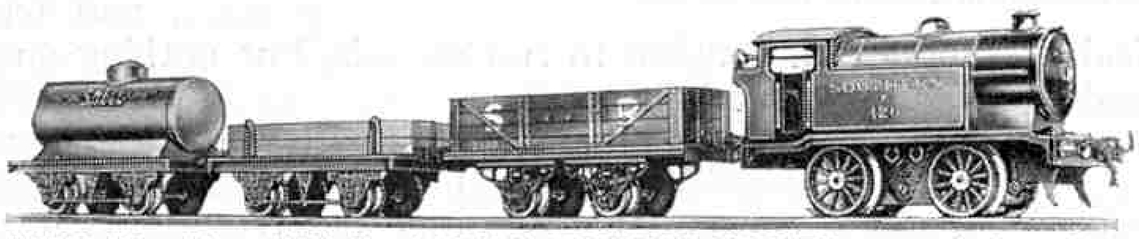
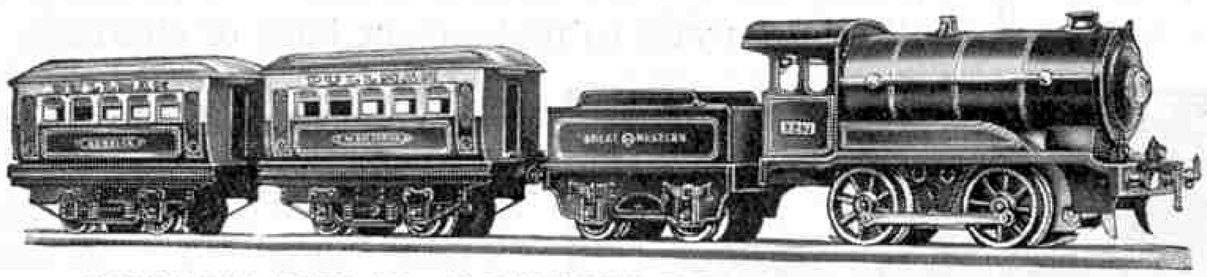
A Selection of HORNBY ELECTRIC TRAIN SETS (20-volt and 6-volt)



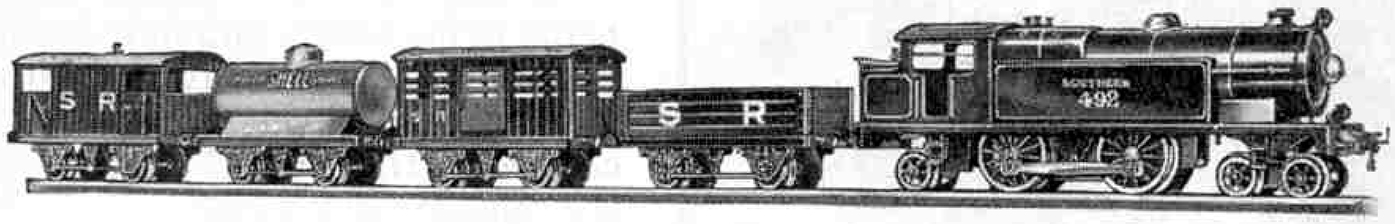
EM120 (20-volt) or EM16 (6-volt) GOODS TRAIN SET (non-reversing). Price **15/–**



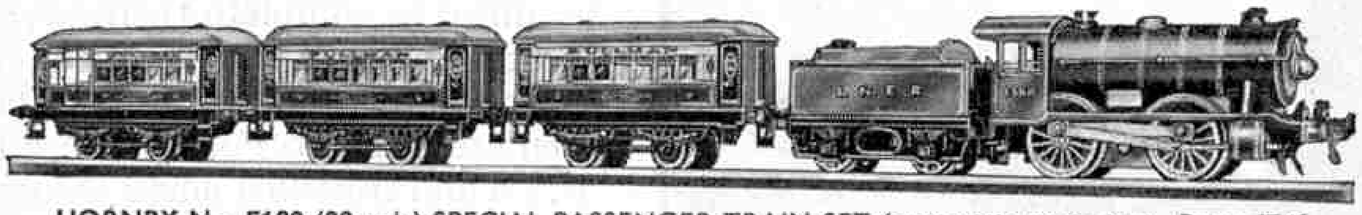
EM320 (20-volt) or EM36 (6-volt) TANK GOODS TRAIN SET (reversing). Price **24/–**



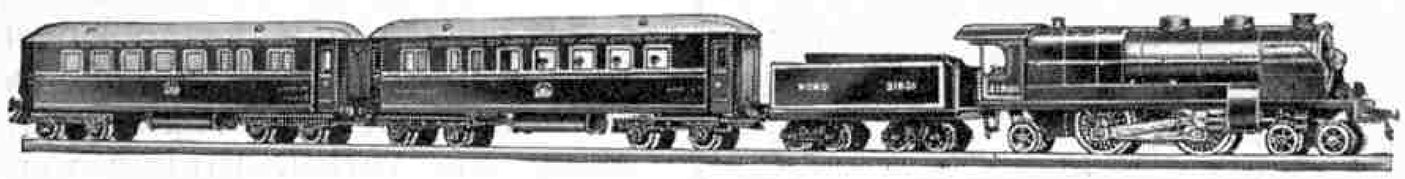
HORNBY No. EO20 (20-volt) PASSENGER TRAIN SET (reversing). Price **30/–**



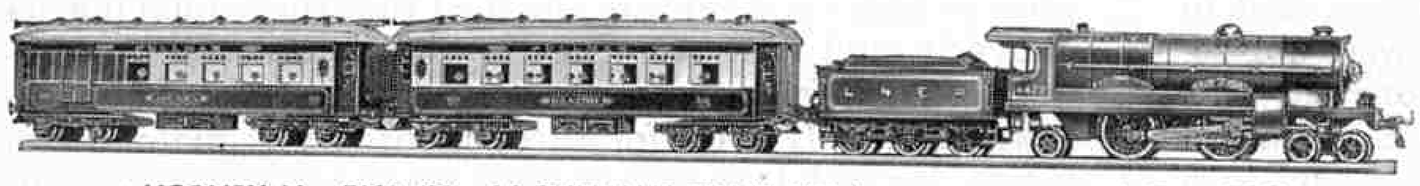
HORNBY No. E220 (20-volt) MIXED GOODS TRAIN SET (automatic reversing). Price **47/6**



HORNBY No. E120 (20-volt) SPECIAL PASSENGER TRAIN SET (automatic reversing). Price **47/6**



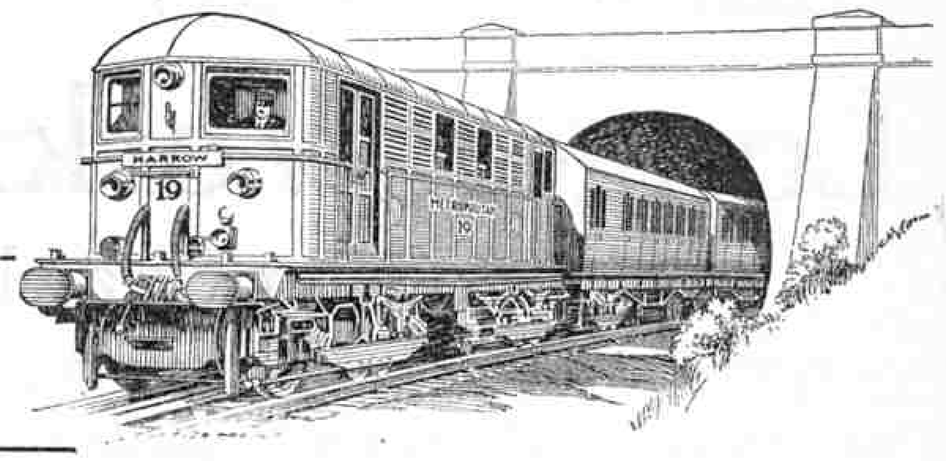
HORNBY No. E320 (20-volt) RIVIERA "BLUE" TRAIN SET (automatic reversing). Price **67/6**



HORNBY No. E320 (20-volt) PULLMAN TRAIN SET (automatic reversing). Price **72/6**

ECTRIC AND CKWORK TRAINS

st like real trains



to accessories can be brilliantly illuminated by tiny re electric lamps. All this is done with perfect th safety by means of a Meccano transformer, a is, simple apparatus that automatically transforms at the mains current down to the low voltage re- ne quired for the railway. The Hornby 6-volt Electric ng Locomotives can be run from a 6-volt Accumulator.

ed Then there is a splendid range of Hornby ic locomotives fitted with clockwork motors. an These are extremely powerful, and capable of nd hauling heavy trains at high speed over long ck distances. With these fine locomotives there is b. no need to fear overwinding; the springs are ne almost unbreakable.

ranging from **15/-** to **75/-** for Electric models and or Clockwork models.

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/6 E220 (20-volt) Special Locomotive (automatic reversing) ... ... Price **37/6**

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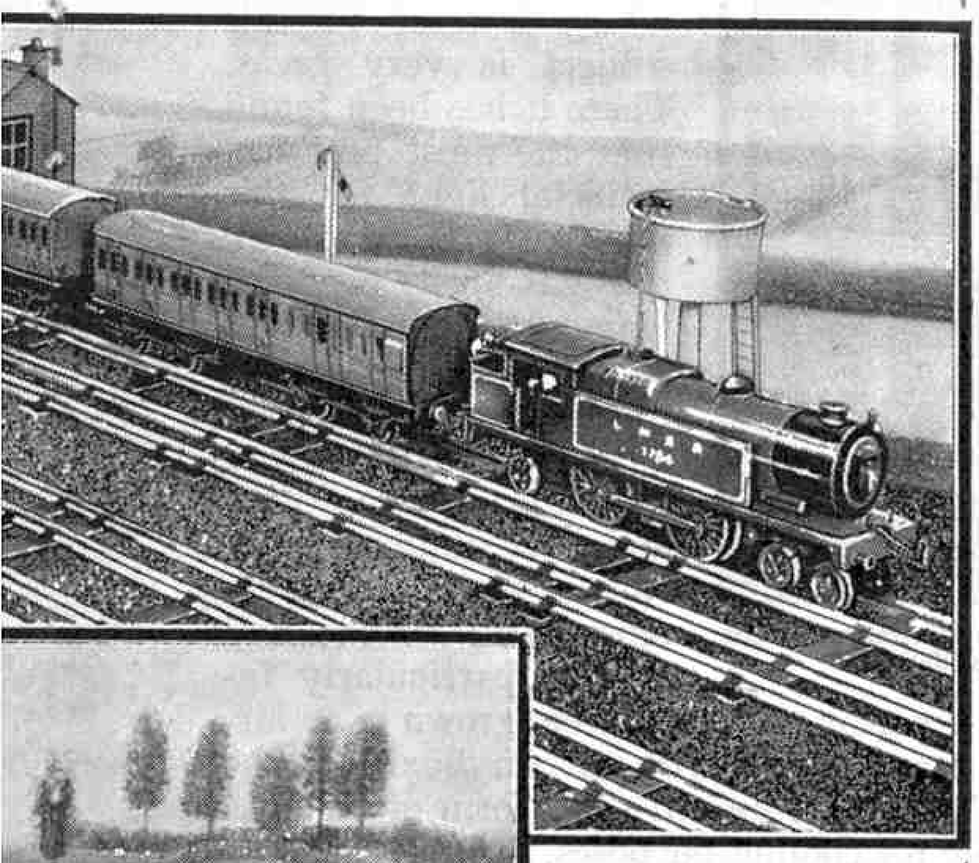
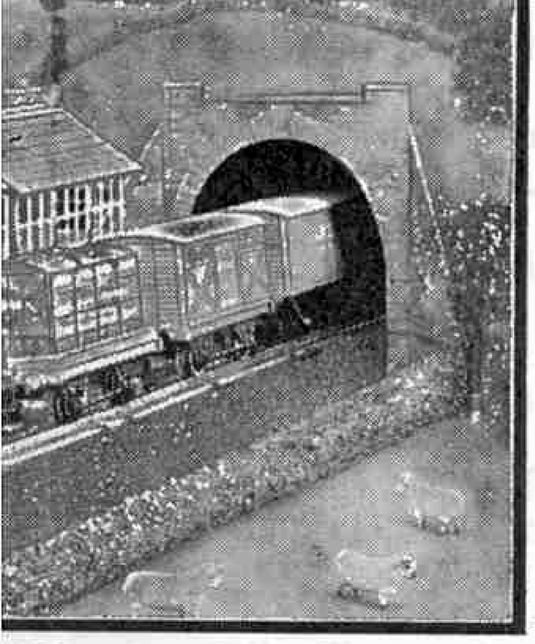
M3 Tank Locomotive (reversing) ... ... ,, **7/6**
/- No. O Locomotive (reversing) ... ... ,, **10/6**
No. 2 Special Locomotive (reversing) ... ... ,, **27/6**
/6

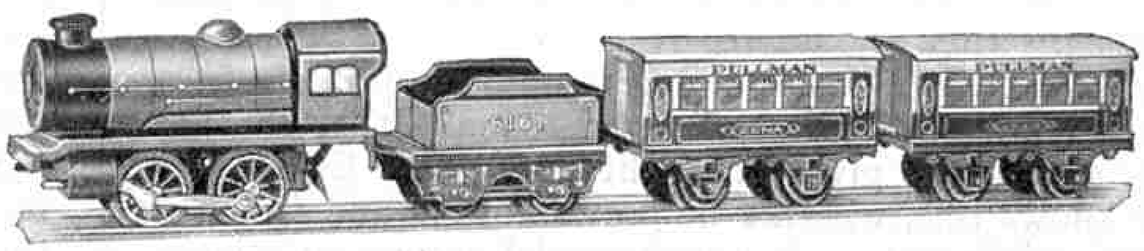




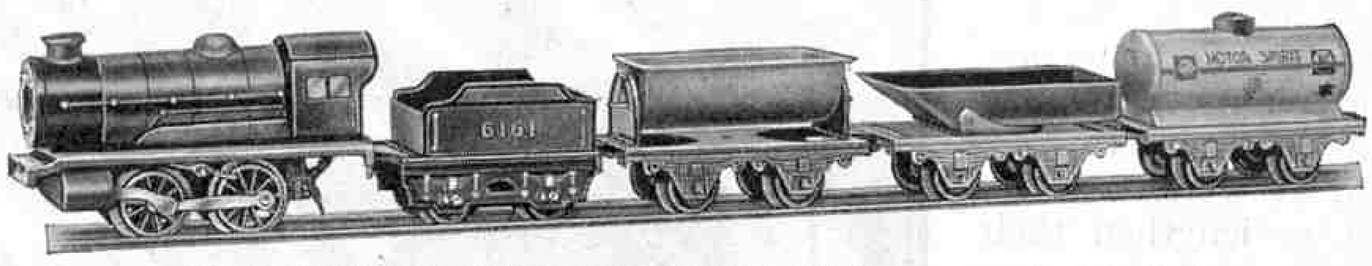
Here is another splendid Hornby Train that you can play with at home! The Flat Truck next to the No. 2 Special Tender Locomotive carries one of the new Hornby Goods Containers, which are exact replicas of the containers now in general use on all British railways.

NS ROAD - LIVERPOOL 13

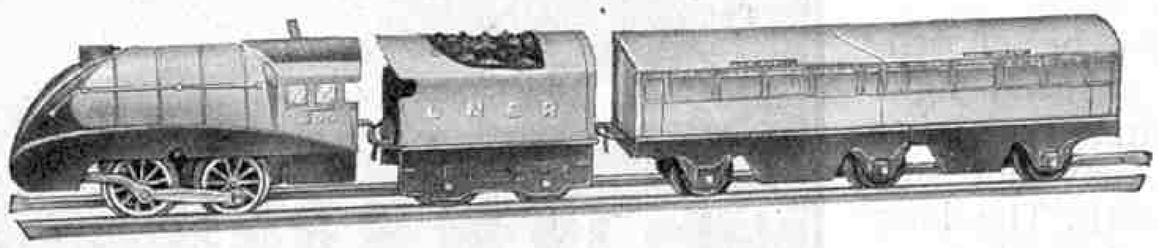
A Selection of HORNBY CLOCKWORK TRAIN SETS



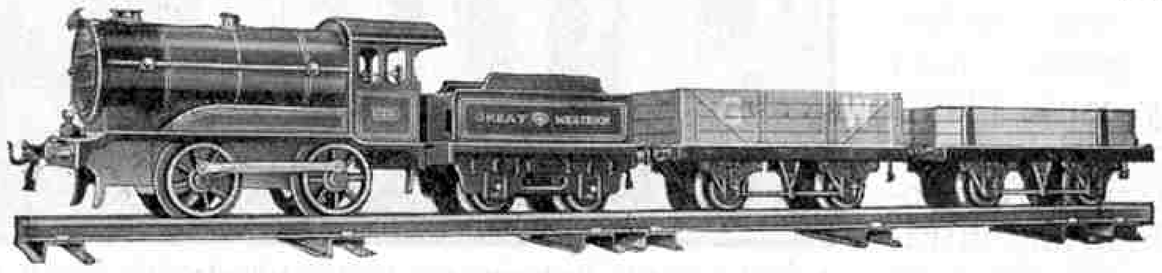
MO CLOCKWORK PASSENGER TRAIN SET (non-reversing). Price **5/6**



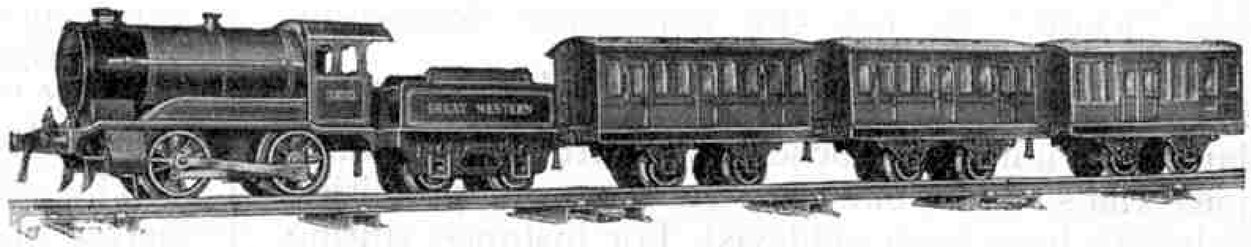
MO CLOCKWORK MIXED GOODS TRAIN SET (non-reversing). Price **6/11**



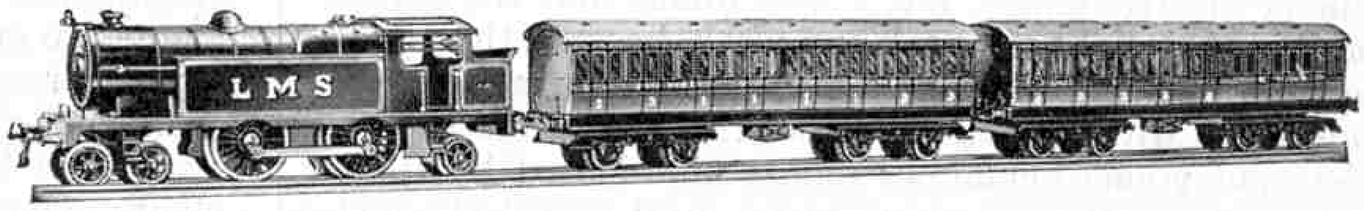
No. O "SILVER JUBILEE" CLOCKWORK PASSENGER TRAIN SET, L.N.E.R. (non-reversing). Price **7/6**



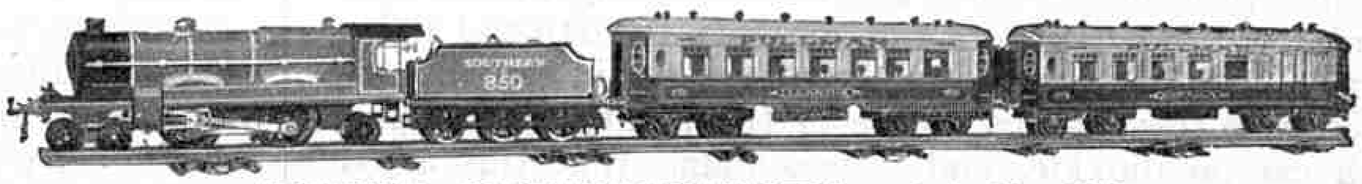
HORNBY No. O GOODS TRAIN SET (reversing). Price **17/6**



HORNBY No. 1 PASSENGER TRAIN SET (reversing). Price **25/-**



HORNBY No. 2 TANK PASSENGER TRAIN SET (reversing). Price **40/-**



HORNBY No. 3C PULLMAN TRAIN SET (reversing). Price **62/6**

Longer Working Days for Plants

Growing Strawberries by Electric Light

THE working day of plants is comparatively short, except in prolonged spells of fine weather in the middle of summer, when the Sun shines brightly on them for long periods. They are then hard at work building up organic substances from carbon dioxide, water and the mineral salts absorbed from the soil by their roots, and they grow rapidly and well. Their growth is fitful and unsatisfactory, however, when rain and clouds shut out a large proportion of the light they should receive.

Unfortunately weather is too variable, especially in a climate such as that of Great Britain, to make it certain that plants are always given the light they need. Every gardener knows this, whether he grows flowers and fruit for his own enjoyment, or is a commercial grower on a large scale. The electrician is now coming to the rescue with efforts to provide plants with the light they need to keep them at work, and indeed to lengthen their working hours by turning their nights into days. The right kind of light must be chosen, for any artificial light that is ample for seeing purposes may not suit plant growth. The long waves of light that we know as red rays are necessary, but unfortunately when used alone they cause plants to grow too quickly, and it is necessary to provide also blue and ultra-violet rays in order to prevent plants from becoming "leggy," to use the expressive description of the gardener.

A special electric discharge lamp used to stimulate the growth of plants. The illustrations to this article are reproduced by courtesy of the Electrical Development Association.

Within the last few years experiments have been made with plants grown in greenhouses fitted with electric lamps of various kinds, and some very striking and promising results already have been achieved. For instance, during the winter of 1933-4, trials were made in Holland with ordinary electric lamps, but it was found that the plants placed in their light grew tall and weak, because the radiation from them consisted almost entirely of infra-red rays. Neon tubes with special reflectors therefore were substituted, and young cucumber plants illuminated by these regularly from 10 o'clock at night until 6 o'clock next morning grew more rapidly and formed stronger roots than similar plants that were not exposed to artificial light. Strawberries were grown with great success in greenhouses fitted with these lamps. Some of the plants were gassed with carbon dioxide, and it was found that this aided growth. Flowering plants also seemed to welcome the extension of their working day that lighted greenhouses gave them. For instance, star of bethlehem was found to flower 14 days earlier with treatment of this kind, and with other plants it was discovered that the stronger the light the earlier the flowering period.

In this country a special floodlighting lamp has been introduced by The General Electric Company Ltd. for plant irradiation, as this treatment is called. The lamp gives a red light, and under its influence cucumber plants have grown so well in their early stages that on planting out they have yielded fruit 10 to 14 days earlier than similar plants grown from seeds sown at the same time, but not irradiated. The plants gave the same yield, whether treated with light or not, but there is a great advantage in the saving of time effected by the use of the special lamps. It was found that the best results follow extending the working day of the plants by about six hours.

Even more remarkable results have been achieved in experiments in the United States, where interest in this subject is very great. There it has been found that the most practical artificial light for this purpose is that given by the gas-filled tungsten filament lamp. Many plants have been made to bloom earlier, especially those that flower normally in late spring and early summer, which can now be made to blossom in winter; and in one particularly interesting series of experiments plants were grown in an air-tight house which was supplied with carbon dioxide in the form of "dry ice," the well-known solid form of this gas now used so largely for cooling purposes.

The electrician is attacking the problem of growing better plants and bringing them along more quickly in other ways. These range from straightforward heating of greenhouses by electrical means, to heating the soil in which plants are grown, the provision of warm water for plants kept in frames or greenhouses, the sterilising of soil, and even the vaporisation of naphthalene and other substances to kill the pests that hinder growth and make plants sickly. Electricity can be used also to add new beauty to a garden at night by means of floodlighting. Miniature waterfalls and fountains can be kept running even in times of drought by the use of pumps that circulate the water; and the drudgery of cutting large lawns can be avoided by using electrically driven mowing machines.

The most obvious use for electricity is in directly heating frames and greenhouses. There are several types

of apparatus that can be used by the owner of a greenhouse. He can fit a tubular heater, or he can suspend special cables that radiate heat to the air surrounding them. Another method consists of installing a small electrical boiler, the hot water from which is circulated through piping in exactly the same manner as in the case of a greenhouse heated by means of a coke boiler.

One great advantage of heating of this kind is that there is no smoke or fumes to cause damage to the plants. The heating is readily controlled by means of switches, and the temperature can be kept constant by installing a thermostat. The heating apparatus then responds instantaneously and in robot fashion to the demands made upon it.

Every gardener knows that many plants grow all the better for what he calls "bottom heat." The old-fashioned way of providing this was to make up a bed of manure and rotting leaves, which slowly warmed up owing to the chemical changes taking place within it. This is a task that requires skill and experience, and also is dirty and somewhat unpleasant. The electrical way is to sink special heater cables at a suitable depth in the soil. These radiate heat steadily, and it is not necessary to go to the trouble of turning the heating material over from time to time, or of renewing it fairly frequently, as with the old-fashioned method.

A remarkable contrast. The tomato plants on the right are growing in electrically heated soil, and are more vigorous than those on the left, which are not supplied with bottom heat.

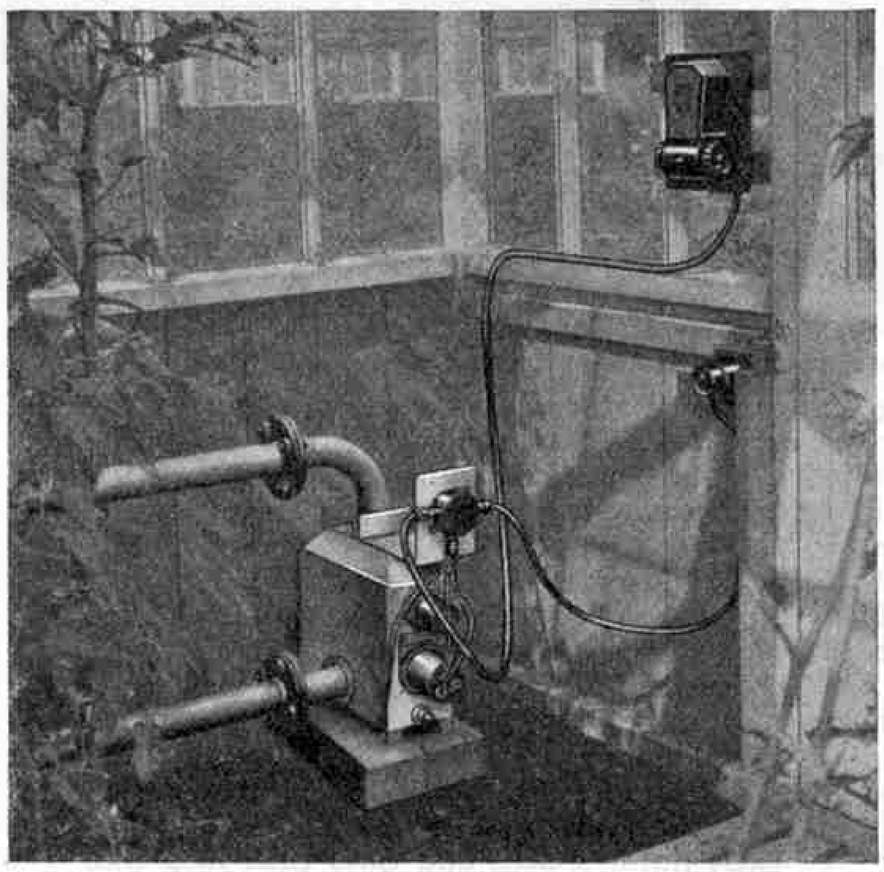
Soil heating cables are designed to give fixed temperatures, such as 50 deg. F., 60 deg. F. or 70 deg. F., and merely require connecting up through a main switch to the electric supply. A standard cable is 10 yds. long and is rated at 200 watts. This length is suitable for a garden frame measuring 6 ft. by 4 ft. As in the case of electric heaters for greenhouses, the cable can be fitted with a thermostat or automatic switch to keep any required temperature in the soil in which it is laid. A separate thermostat also can be used. This can be set to any desired temperature, and so the frame in which it is fitted can be used for various purposes.

Making an electric hot bed with a cable of this kind is very easy, for the cable is simply buried in a layer of sand underneath the soil in the frame. The purpose of the sand is to give even distribution of the heat that it produces, and this is prevented from escaping too quickly by side insulation in the form of ashes or fine clinker. A layer of wire netting is placed above the cable before the soil is put into position, so that the electrical apparatus is protected against damage from spades or other gardening tools while the soil is being turned over or removed.

One interesting use to which hot beds of this kind has been put is in growing lettuce and other salad materials in frames in early spring. They also can be used for rooting slips or cuttings, germinating seeds or forcing plants, as well as for excluding frost from frames in winter.

Borders in greenhouses can be heated by means of electric cables of this kind sunk in them, and in particular this method can be used in raising crops of tomatoes. The upper illustration on this page shows the remarkable effect of using a soil heating electric cable. Two rows of tomato plants seen in it were set out at the same time alongside each other, one in an ordinary bed and another in an electrically heated one. The plants supplied with bottom heat are remarkably vigorous and healthy, and this is not mere growth, but all-round progress, for the plants growing in the heated soil yielded more fruit and did it more quickly than those given ordinary treatment.

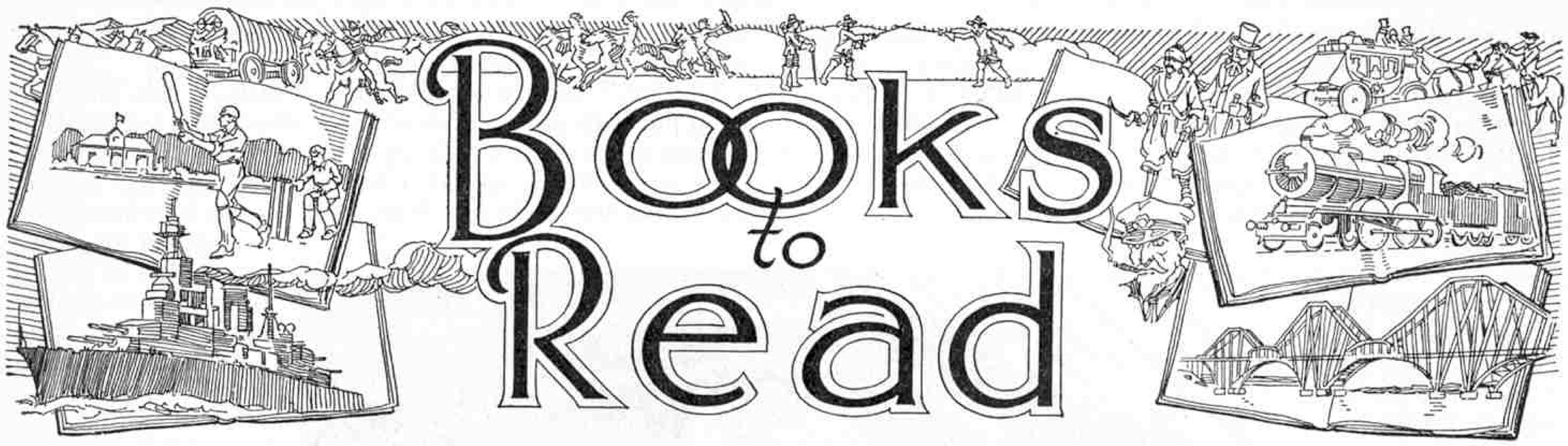
We have grown accustomed to the idea of wiring a house for electric light and power, but that of wiring a garden seems as yet a little novel. Actually there is no difficulty in this, and the cost is by no means excessive. The cable can be buried from 2 ft. to 2 ft. 6 in. in the ground, and the line taken by it should be permanently marked in some manner, so as to ward off over-vigorous gardeners.



An electric hot water system in a small greenhouse. On the right is a thermostat that maintains a constant temperature.

The chief cost of wiring a garden in this manner is that of digging a trench, and no garden enthusiast would hesitate to do this work himself in view of the novelty of the plan and the excellent results to which he can look forward. If a buried cable cannot be used, a rubber covered one can be slung overhead. The sides of fences provide places to which it can be attached, and paths can be crossed by means of arches that are put to good use in supporting growing plants.

The keen gardener looking for means of improving his garden naturally is attracted by electricity, which can help him in so many ways, because it is clean and simple to use. The cost of course is a matter of importance. Fortunately additions can be made one by one, each costing perhaps only a few shillings, so that a whole garden can be electrified in a comparatively short period without an extensive first cost. The running costs depend on the temperatures that are to be maintained in the frames and greenhouses.



Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"The Animal's World"

By Doris L. Mackinnon, D.Sc. (Bell. 7/6 net)

This well-written book is one that will appeal to all *"M.M."* readers. It tells, simply but with scientific accuracy, how animals live; how they move, breathe and eat, and how they get news of their own particular world through their eyes and other sense organs. In its pages we meet animals with which we are all familiar, and others that are strange and curious in their way of life. We read of the silkworm with breathing holes along its side like the portholes of a ship; of the lattice window of an insect's eye; of the eight ears of the jelly-fish. We learn why a sleeping bird does not fall from its perch; how a camel stores food and water; how flies are able to walk on the ceiling, and how snakes propel themselves along by manipulation of their ribs.

Perhaps the most interesting chapters are those that deal with the childhood of animals, and show how the various creatures grow up, and live together in families or tribes. We are told how they talk to one another, why they differ so widely in their behaviour, and how they protect themselves against their enemies in the unceasing struggle for existence. In short, the author shows us the animal world from the inside, and gives us a fascinating glimpse of the actual living machinery. The whole scheme is completed by an account of the plants without which there would be no world of animals at all, for there would be nothing for them to feed on. In return, many plants depend upon the animal world for their continued existence. For instance, the earth-worm benefits the plant to a remarkable degree. This book also tells many interesting stories of even closer partnership between plants and animals, and in doing so reveals why honeysuckle and certain other plants smell sweeter in the evening, and explains why red clover would not produce seed in New Zealand until bumble-bees also were taken there.

The book is very fully illustrated by a series of excellent photographs, together with many well-prepared drawings.

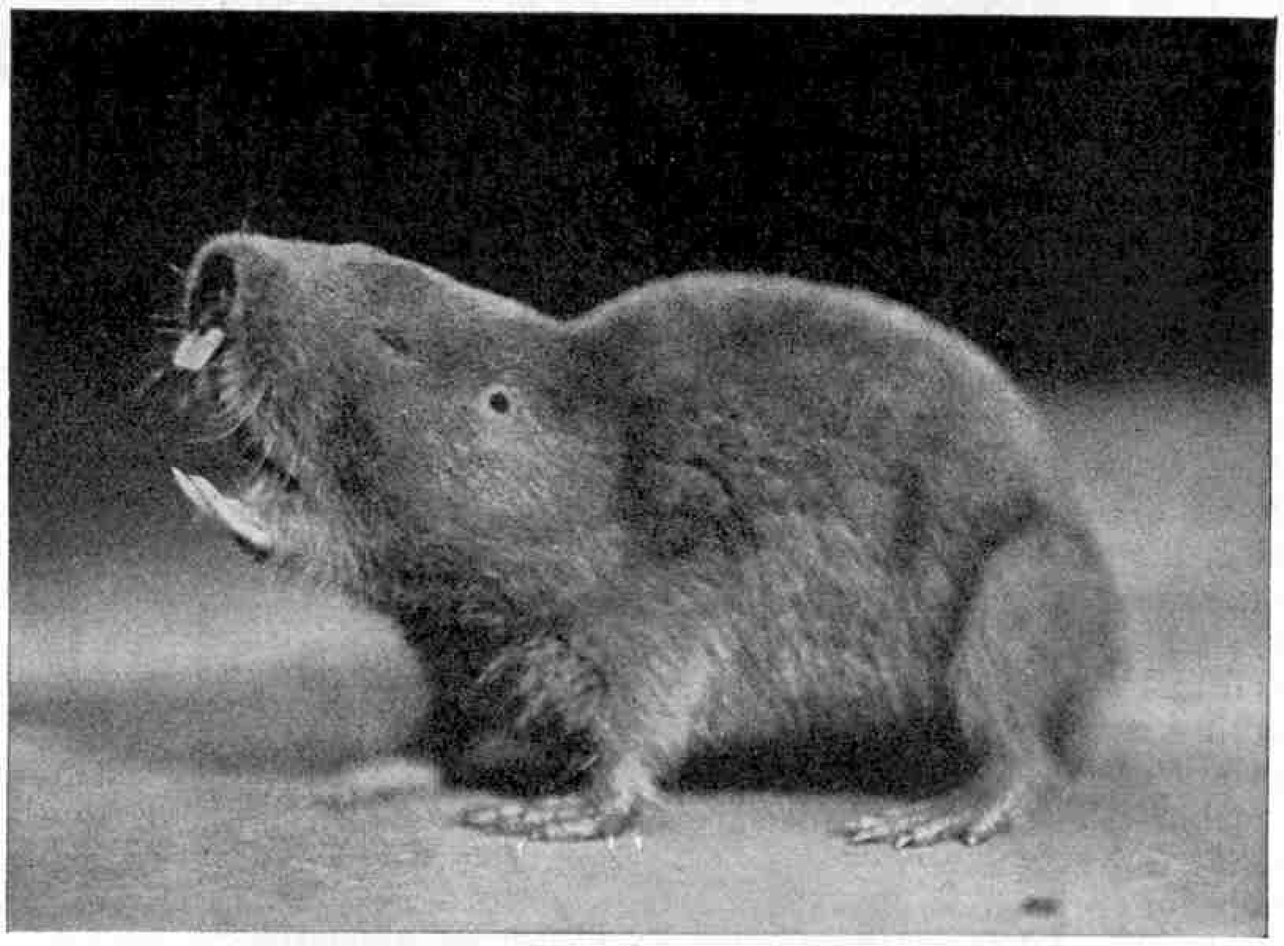
"Strange Sea Shells"

By A. Hyatt Verrill. (Harrap. 10/6 net)

There are few people whose interest is not at once aroused at the sight of a collection of shells. These are often so attractive in colour, and present so many contrasts in size and form, that they are popular both with those who live by the sea and with those whose homes are far inland. Yet the full extent of their fascination is not sufficiently realised. Mr. Verrill makes this clear by his strange but true stories of sea shells from all parts of the world. His book is not a mere description of the shells that can be found on various coasts, but a romantic story of strange creatures of the sea, and of their homes. In it we read of a shell-fish that can jump, of others that are astonishingly fragile but can bore through the hardest rocks, and of one with a shell richly decorated in yellow and red that has a poisoned barb more deadly than the fangs of a rattlesnake. Another of the strange creatures that live in shells has eyes with no pupils and lenses, and yet can see excellently.

Of the shells themselves, the author describes one that has on it music—or at least lines, spaces and dots that look like music! Another shell of which the full story is told is so rare and valuable that it has actually been counterfeited. Descriptions are given of a wonderful array of beautifully coloured shells of all shapes that will delight and surprise readers. The oyster receives its share of attention, and an account is given of the making of an oyster farm and of the gathering of the harvest from it. How pearls are produced provides another interesting story, and the range of the book is extended to many strange creatures of the sea, such as squids and octopuses, that are associated in some manner with shells.

The book will be found of absorbing interest, especially by those who themselves have collected shells, for the author's practical knowledge and long acquaintance with these creatures of the sea are evident on every page. An excellent coloured frontispiece shows some of the strangest and most attractive of shells, and in addition there are many drawings in the text.



A mole-rat showing his front teeth. From "The Animal's World," reviewed on this page.

"Smiler Jim" and Other Stories

By Robert Harding
(R.T.S. 2/6 net)

The scene of Mr. Harding's first story is set in the East which he knows so well and has used to advantage in earlier thrillers. "Smiler Jim" is in the Secret Service and is sent out on the dangerous mission of discovering the mystery of the Valley of Death, in the heart of the Arabian Desert, with the knowledge that if he fails it is likely that the whole of Arabia will be deluged in blood. He falls into the hands of an unscrupulous chief, but he succeeds in foiling the plot that had threatened danger to the country.

The remaining stories in the volume deal with adventures with wild elephants in India, escapes and fights in the desert, and with thrills in the wilder parts of Canada and at home on the Norfolk Broads.

"Twenty-Six South Sea Stories"

By Arthur Russell. (R.T.S. 3/6 net)

We are accustomed to expect stories crammed with lively doings and exciting adventures from Mr. Russell, and his latest collection is worthy of his reputation. The yarns deal with peril and romance in the South Seas, and introduce the reader to Mr. Harley Derham, a secret service agent, Bully Hargreaves, a notorious "blackbirder," and a host of pirates, cannibals, treasure-seekers and gun-runners. Some of the stories deal with savage life among the natives, and in others wireless, aeroplanes and modern scientific inventions figure prominently. A coloured frontispiece and four plates illustrate the book, which is a mine of interest for those who revel in stories of pluck and daring.

"Photography"

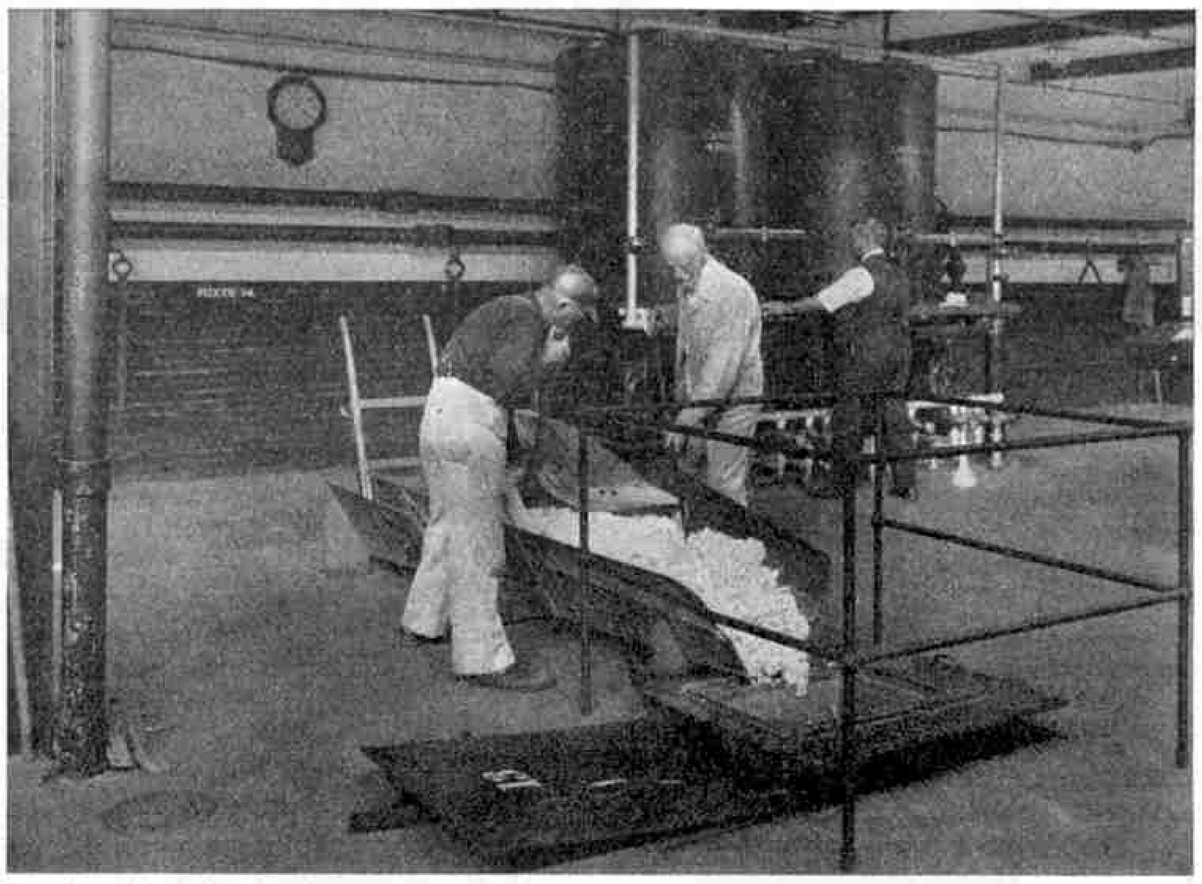
By D. E. K. MEES, D.Sc. (Bell. 7/6 net)

Dr. Mees is one of the greatest authorities on photography. He has been Director of Research and Development of the Eastman Kodak Company since 1912, and as he knew well many of the pioneers of modern photography he is fully qualified to tell his readers all about it. They will not be disappointed by his book, for it gives a complete background to photography and is a mine of practical information based on life-long experience and study.

The first chapter tells the story of the beginnings of photography and traces its history down to present times, contrasting the clumsy methods used by enthusiasts of 50 years ago with the simple and easy manner in which photographs can now be taken by cinematograph and ordinary cameras that can be carried in the pocket. How the cameras, plates and films they use are made is next explained, and an interesting sidelight on the popularity of photography is given by the information that 20,000 people are employed in the industry, which every year absorbs about 500 tons of pure silver. Modern photographic methods are then described, followed by chapters on what happens when a plate is exposed and is subsequently developed and fixed. The reproduction of tone values by photography is particularly well dealt with, and every amateur photographer who follows Dr. Mees' account of this subject should be able to improve his own photographic work.

Other chapters deal with the cinematograph, including the making of animated cartoons, the photography of coloured objects, and photography in colours, in which keen interest is now being taken. Finally comes a chapter on the widely different uses that have been made of photography.

Excellent use is made throughout of ingeniously planned diagrams that help readers to understand the explanations of photographic processes given by the author, and a remarkable series of 30 full page plates, several of which are in colours, add greatly to the attractions of the book.



Putting nitrocelluiose into a mixer during the production of photographic film base. This illustration, and the one below, are from "Photography," reviewed on this page.

"The Riddle of Dr. Milverson" and " 'Ferret' of the 'Omnipotent' "

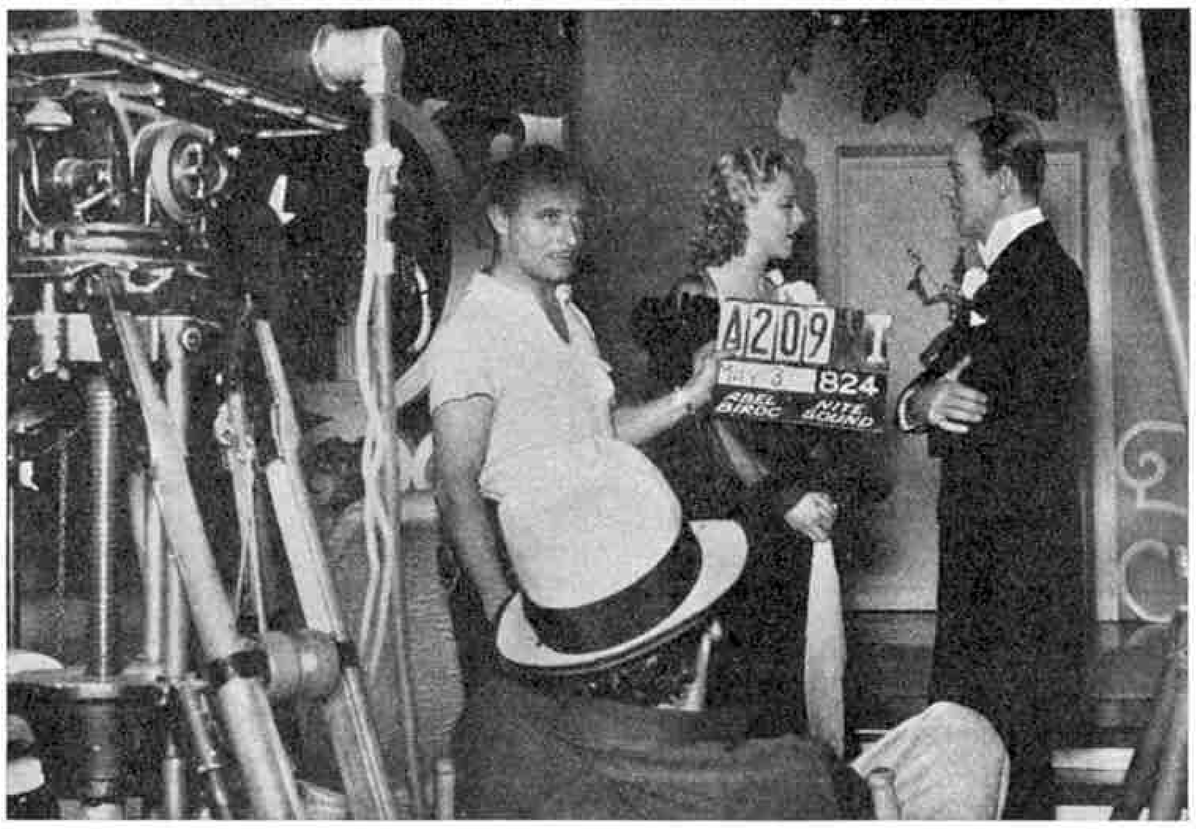
By CAPTAIN OSWALD DALLAS
(R.T.S. 2/6 net)

Captain Dallas is an old hand at writing a thrilling and exciting story, and these volumes are characteristic of him. The first deals with the efforts of Billy Milverson to find his father, who had disappeared shortly before the school holidays. The search leads the boy into a succession of wild adventures, in which an old soldier and two midshipmen, known as the "Ferret" and the "Owl," give him stalwart assistance in unravelling the mystery. The two midshipmen re-appear in " *'Ferret' of the 'Omnipotent,'* " a breezy yarn, full of both humour and adventure, in which the heroes fall into one scrape after another.

"The Boys' Own Annual"

(R.T.S. 10/6 net)

This year's *"Boys' Own Annual,"* the 58th of the series, maintains the high standard and varied interest of its predecessors, although its price has been reduced to 10/6. As usual, it contains a good selection of serials and short stories, all by well-known writers and full of thrills and adventures. The general articles are particularly good, and cover a very wide range of subjects, from the assault on Mount Everest to flying, lighthouses and lightships, and other matters of great interest to all boys. There are more dog yarns, a feature continued from last year's volume; and articles on games and sports, hobbies, and how to make things complete a fine volume, which contains four coloured plates and many other illustrations.



An assistant holding the signal board before a scene is shot while making a moving picture. The board gives the date, the picture number and other details.

"The Schoolboys' Annual"

(R.T.S. 3/6 net)

The contents of this Annual are extremely varied and attractive, and practically every feature in it will appeal strongly to boy readers. It contains a range of stories of school life and adventure and daring in all parts of the world, and other attractions include articles on sports and hobbies. There are several coloured plates, in addition to illustrations in black and white.

"The Modern Book of Aeroplanes and Airships"

By W. H. MCCORMICK. (A. and C. Black. 5/- net)

This book is a companion volume to the *"M.M."* Editor's *"Modern Book of Lighthouses, Lightships and Life-boats,"* which was reviewed last month. It deals in a vivid and comprehensive manner with the conquest of the air, telling the story of Man's efforts to fly from the very earliest days of balloons right down to the present time.

It is a little difficult for the modern boy to realise the daring of the pioneers who first left the surface of the ground in crude balloons filled with hot air, but the thrilling character of the ascents of the Montgolfiers and other early aeronauts is well conveyed in the account given by the author of their achievements. How these eventually led to the development of the modern rigid airship is fully explained, and the stories are told of great and hazardous flights in famous airships, including R.34, the British vessel that in 1919 made the first crossing of the Atlantic by air.

From the airship the author turns to the aeroplane. After explaining how the aeroplane originated in the gliding experiments of Lilienthal and others, he tells the story of the Wrights, the first men who actually flew in a heavier-than-air machine that was under control. Their triumph in spite of misfortune is thrillingly described, as are the daring flights of pioneers such as Roe in this country, and Latham and Blèriot, the famous French airmen whose exploits attracted so much attention.

At this stage of development came the Great War, and the author shows how the demand for machines for special purposes, such as fighting, bombing and photography, led to remarkable advances in design. The following years saw the production of bigger and faster machines, and also of unusual and ingenious types intended to give greater safety and stability in the air. The most important of these unusual machines is the Autogiro, the latest type of which actually rises vertically into the air. The part played by the engine in these developments is not overlooked, and descriptions are given of the highly efficient power units installed in modern aeroplanes. Then follows a chapter describing the aeroplane in flight. This is short, but gives a remarkably detailed and accurate picture of the actions of the pilot of machines while taking off, flying and landing.

The remaining sections of the book are devoted to modern flying in all its branches. The author first shows how the network of airways is gradually spreading over the world, and then describes famous flights and air races. The excitements of Schneider Trophy Contests, King's Cup Air Race and the MacRobertson Race are well described, and a final chapter tells how airmen use wireless to find their way.

The book is well illustrated by means of photogravure illustrations. D.G.

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A Trip on an Austrian Cable Railway

When staying at Innsbruck recently I decided to go up the cable railway that leads almost to the summit of the Hafelekar, a mountain 7,644 ft. high. The first part of the journey is made by funicular railway, and it was a wonderful experience to see Innsbruck appearing to grow smaller and smaller as the car crawled slowly up the slopes.

About 20 minutes after starting the train stopped at the village of Hungerburg, where we changed to a cable car. As the accompanying illustration shows, this is a small box-like compartment suspended from pulleys running on one stout wire rope and hauled up by means of another. It was a thrilling, and rather fearful sensation, to look out of the windows and to see the tops of the pine trees slipping past beneath us. This part of the ascent occupied about ten minutes and brought us to Seegrube, a small station at a height of 6,239 ft., where we changed into an even smaller cable car that took us within about 30 ft. of the summit of the mountain.

From this great height I obtained wonderful views of Innsbruck and the surrounding country. The snow lay thickly around. It was dry and powdery and I thoroughly enjoyed a snowball fight with other passengers in which I took part. Coming down the mountain was even more thrilling than going up, as the ground beneath us seemed to rush up to meet us at a terrific rate. G. A. BARRY (Ayr).

Cars travelling up and down the Hafelekar cable railway, near Innsbruck, in the Austrian Tyrol. Photograph by courtesy of the Innsbrucker Nordkettenbahn.

St. Catherine's Lighthouse

St. Catherine's Lighthouse is on the rocky south coast of the Isle of Wight, and is one of the most important in this country. When I visited it, I was shown a plumb line hanging from the top of the tower. The pointed end of the weight is not now exactly over the mark made for it, which shows that the structure has moved a little to one side since it was built.

There is a small fixed red light about half way up the lighthouse. This is equipped with lenses, but is much less powerful than the main light at the top of the tower, although it can be seen from a distance of 16 miles. Its beams fall upon dangerous rocks known as the Atherfield Ledge.

A flight of very small steps leads to the main light, with its vast prismatic lenses that concentrate the rays of light into central beams. The light is very powerful, and St. Catherine's can be recognised by its quick white flashes, each lasting only one-fifth of a second, which occur every five seconds. The revolving mechanism that intercepts the light to form the flashes is operated by clockwork. It weighs 2½ tons, but is so finely constructed that the pressure of my finger caused it to revolve as it floated on its bath of mercury.

While I was in the lighthouse the fog siren was being tested. When this is working every blast is recorded, so that there can be no dispute as to whether it was really operating if any wreck or accident occurred. Two blasts, one high and one low, are given in quick succession every minute.

In the migrating season thousands of birds are attracted by the light. Formerly these obstructed the beams by flying round when unable to find a resting place, and for this reason special perches have now been fixed below the light for them.

E. MACKERNESS (Old Stratford).

The Sexton and the Robin

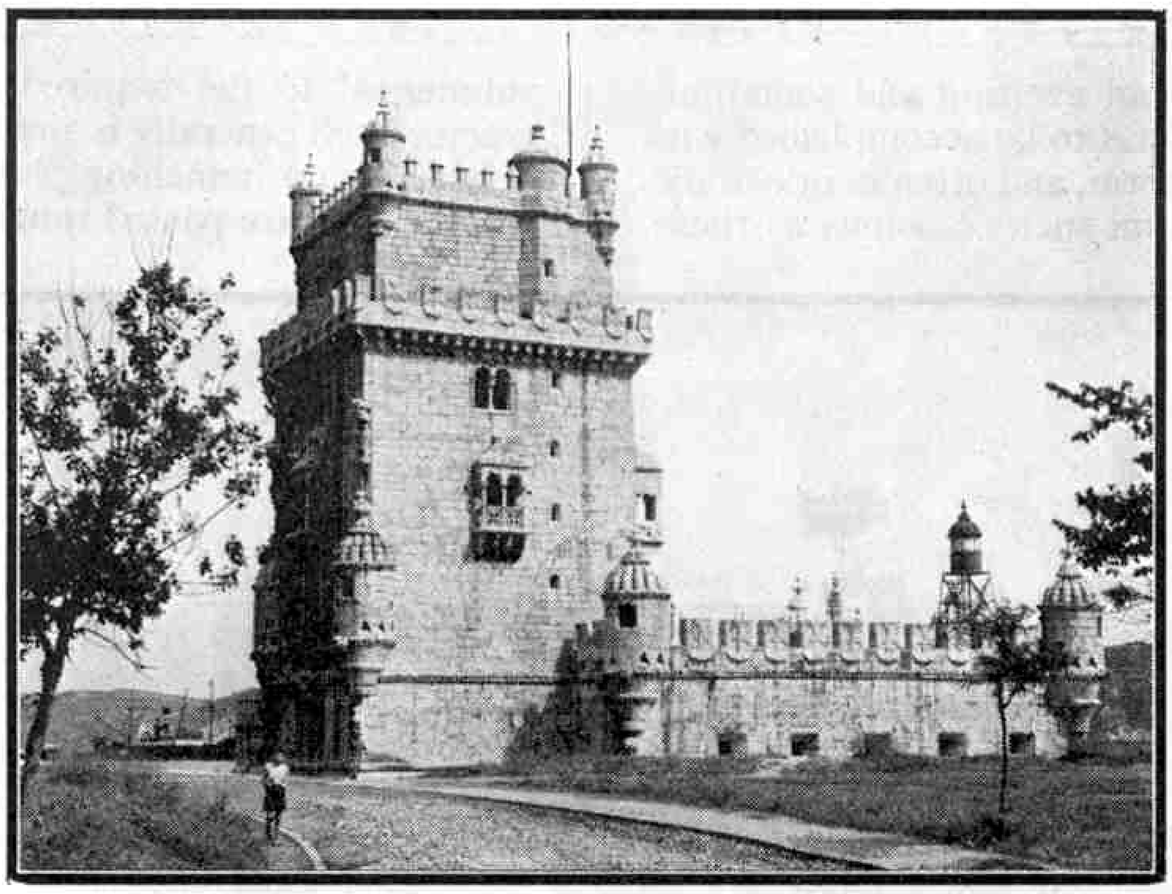
When I was looking round a churchyard in the New Forest district, I was told by the sexton that he regularly fed a robin, which came to him whenever he called it. I was greatly interested and walked with him to the place where the bird spends most of its time. It could not then be seen, but the sexton made a curious humming and whistling sound, and presently it appeared and flew on to a rail. When the sexton placed a small piece of cheese between his lips the bird flew up and took it.

I was very eager to take a photograph showing the robin flying up to the cheese, and did so with an exposure of a five-hundredth of a second. J. H. VICKERS (Oxford).

A Lisbon Landmark

The Torre de Belem, shown in the photograph reproduced on this page, is a fortress tower standing like a sentinel on the left bank of the Tagus, where it forms an excellent landmark for vessels approaching Lisbon. It was built during the 15th century, and provides an excellent example of the manner in which rivers may change their courses. When it was erected Portuguese mariners were able to sail round it; and in 1497 it witnessed the departure of Vasco da Gama on the great adventure that resulted in the discovery of the sea route to India, an event that is commemorated by a monastery built near it in honour of the great explorer. To-day the tower is stranded high and dry on a sandy beach, for the river now flows in another channel.

Belem is a suburb of Lisbon and is easily reached by tramcar or electric train. Visitors to the tower are shown round by a soldier from the neighbouring fort and are well rewarded for their trouble. The view from the upper tower is very fine, and the subterranean dungeons also are interesting, for they are dark and grim, and one can imagine the unpleasant sensations of those who were confined in them when the tower was used as a state prison, about 100 years ago. T. BROOKS (Halifax).



The Torre de Belem, a Portuguese fortress tower built over 400 years ago. Photograph by T. Brooks, Halifax.

A Coal-mine Rescue Station

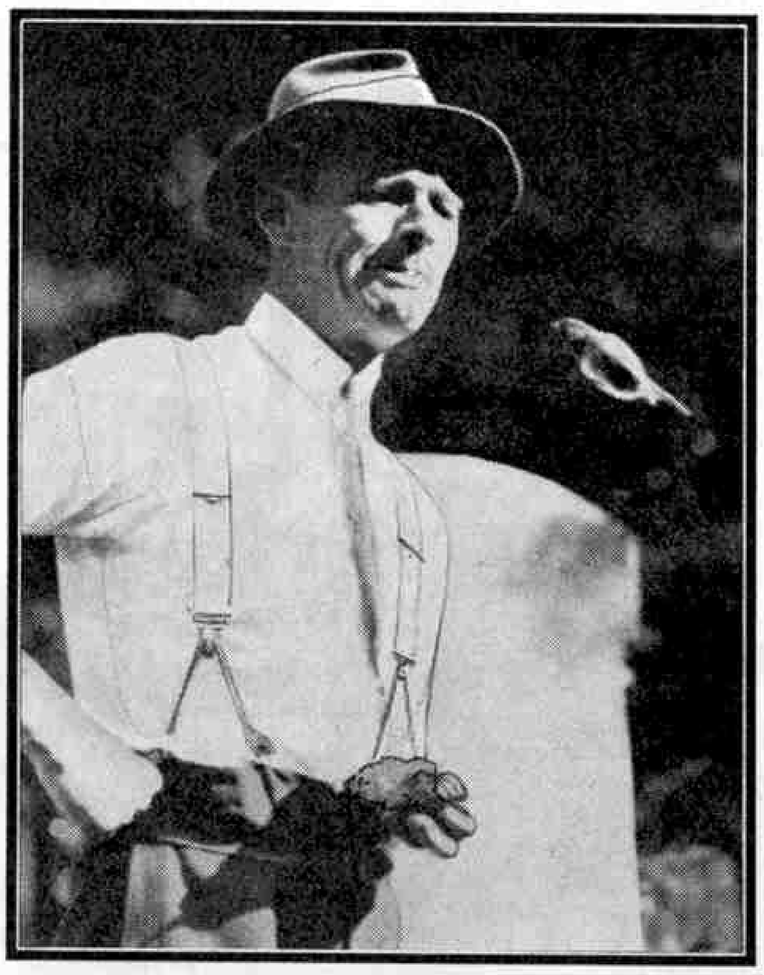
At Wakefield there is a rescue station built and maintained by the coal owners of the West Riding of Yorkshire. The object of the station is to train teams of men in the art of rescue work in pits in which there has been a disaster of some kind, and I was very pleased to have the opportunity of inspecting it.

The chief feature of the station is an exact reproduction of the galleries of a coal-mine. These wind about under the concrete floor of the station itself. They have low roofs, and in them are long low tunnels, only about 2 ft. in height, that give the men in training practice in crawling along in narrow spaces. There are also obstacles such as beams and sandbags over which they have to climb. Here and there, laid on a sandy floor or propped up in dark corners, are dummy figures dressed like miners, and the rescue men are trained to find them and carry them out into pure air. Gas masks and special helmets are worn in the galleries, and these sometimes are filled with smoke in order to make rescue practice more realistic and difficult.

The men are taught the use of artificial breathing apparatus, how to handle hose pipes and fire extinguishers, and the methods by which gassed or drowning people are revived, either by artificial respiration or with the aid of oxygen.

I was particularly interested in a large van, fully equipped with rescue apparatus, that is always in readiness to be despatched to a coal-mine at which an accident has occurred. It carries two dozen sets of breathing apparatus, placed in special lockers, together with ambulance requirements, fire extinguishers, oxygen apparatus, stretchers, clothing, blankets, and in fact anything that is likely to be needed. In addition it has space for a crew of about a dozen men, and before seeing it I would not have believed that so much equipment could have been stowed in so small a space.

T. E. W. SMITH (Halifax).



A robin flying up to take a tit-bit from the lips of the sexton of a New Forest church. Photograph by J. H. Vickers, Oxford.

The Mandi Memorial Stones

The State of Mandi, in India, lies among the Himalayas about 150 miles east of Lahore. It has had a long and interesting history, which finally resulted in a treaty between the British and the Rajah of Mandi in 1846.

The state is chiefly agricultural, but in late years it has come into prominence on account of the fact that one of the largest hydro-electric schemes in the world was put into operation there in March 1932. This now supplies current to an area in the Punjab that is about as large as Great Britain. The capital is Mandi, which was founded in 1527 and stands at the junction of the rivers Bias and Mala.

There are many temples and places of interest in the state, and of these the Memorial Stones erected just outside the capital on the banks of the river Mala are perhaps the most outstanding. These stones have been set up in memory of various Rajahs of the State. They vary in height from 2 ft. to 12 ft., but all are of about the same width and thickness. Their surfaces are elaborately carved with portraits of the Rajahs they commemorate, their wives, and certain of their retainers, who were burned with their bodies. At one time it was the custom for the wives of the Rajahs to be burned in this manner on the deaths of their husbands, but sutti, as this custom is called, was abolished by the British Government. The most recent of the stones illustrating the custom shows that 20 wives were burned with the Rajah in whose memory it was set up.

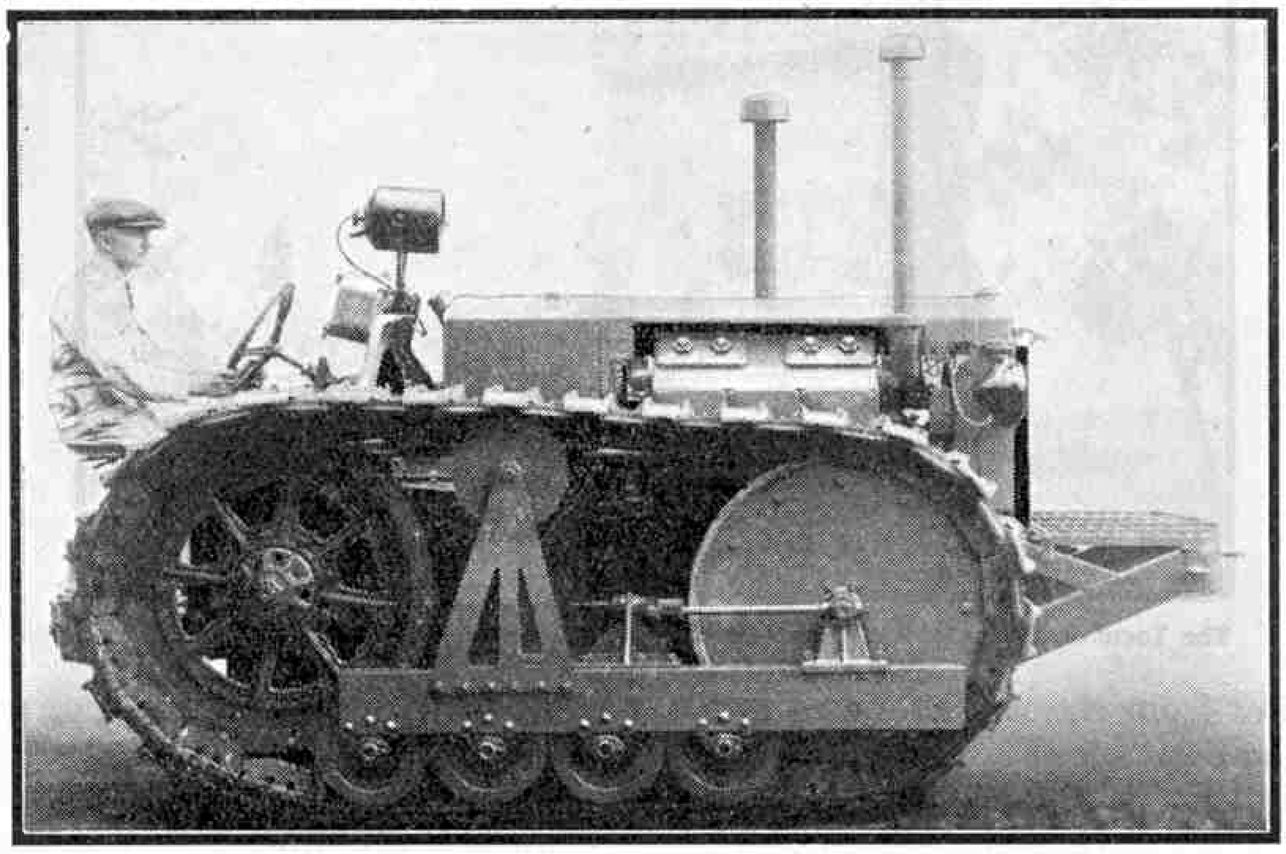
The tops only of some of the stones are visible, the rest being buried beneath the dust of ages. The largest stones are those erected in memory of ruling princes, and to the left and right of these respectively are smaller ones commemorating their daughters and sons who did not succeed to the throne. J. MULLEN (Simla).

Life-boat Launched by Tractor

Power Unit that can Work in the Sea

LAUNCHING a life-boat is an exciting and sometimes difficult task, for usually it has to be accomplished with the utmost speed in a raging storm, and often in inky darkness. Nothing must go wrong on such occasions as these, for if it does the lives the life-boat has been provided to save may be lost, and the rescuers themselves may be in danger.

Where the condition of the beach permits, a life-boat is launched on a carriage that runs down launching ways into the sea. At stations where permanent launching ways cannot be built, it is mounted on a special carriage that is hauled by men or horses into the sea to a sufficient distance to enable the boat to be floated off. The beaches at many life-boat stations around our coasts are not smooth stretches of sand, however, but accumulations of treacherous mud patches, rocks and loose shingle, and at these places it is usual to employ a special tractor to haul the life-boat carriage to the sea. Tractors have been in use for this purpose for many years, and the Royal National Life-Boat Institution, which controls and maintains the life-boat service in this country, is now experimenting with a new machine of the type illustrated on this page. This tractor was built by Roadless Traction Ltd., Hounslow.

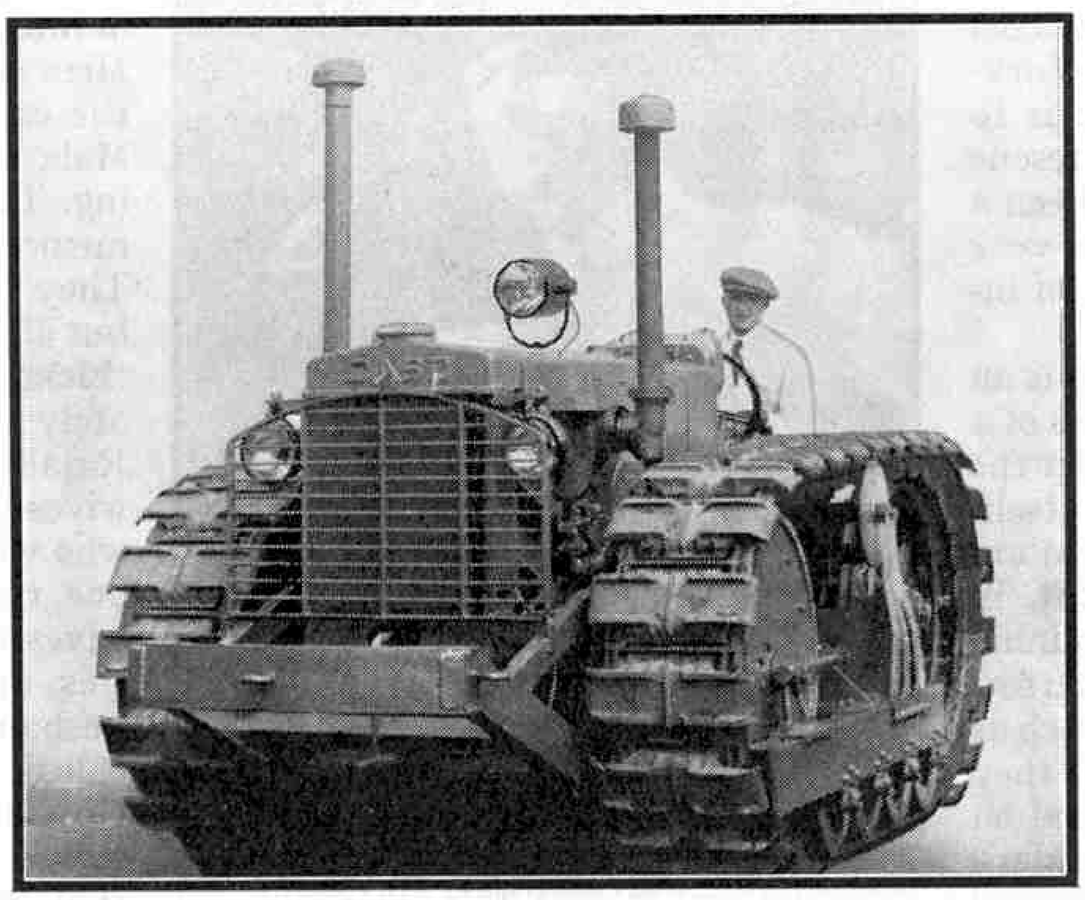


The Royal National Life-boat Institution's new tractor, designed for launching life-boats, continues to work even when partly submerged in the sea. The illustrations on this page are reproduced by courtesy of Roadless Traction Ltd., Hounslow.

What is required of a tractor for the life-boat service can best be realised by following the course of an actual launch. The life-boat is mounted on its carriage with its stern facing forward. The tractor is coupled up and proceeds along the beach to the spot selected for the launch, hauling the life-boat after it, and there it actually enters the sea, in which it may be submerged to a depth of 3 to 4 ft. It is then turned so as to face up the beach, bringing the bow of the boat towards the open sea. It is next uncoupled and turned round on the beach, so that it can push the life-boat farther out until the carriage is submerged to the required depth. When doing this the tractor itself generally is almost under water. Two ropes are attached to a launching platform at the front end of the tractor, and are passed round pulleys at the front, or seaward end of the carriage, finally being brought back and attached to the stern of the life-boat. As the tractor then travels up the beach, the life-boat is pulled off the carriage into the sea.

In severe storms the tractor is not merely partly under water, but also is swept and battered by heavy seas, and shingle or floating debris may be thrown violently against it. The machine must be very robust and entirely waterproof in order to withstand such severe treatment. All delicate working parts of the mechanism must be enclosed and adequately protected, for the entry of sea water might result in the loss of the entire tractor, apart from making the launching of the life-boat impossible.

Complete sealing is provided in the new tractor. Every opening through which water might pass, even in the stormiest weather, is closed and all parts of the power unit and steering mechanism that require it are protected against the action of water by some form of sealing device. Some of them are closed in by casing connected to the air intake pipe of the engine, the top of which stands 7 ft. 6 in. above the ground level.



A front view of the new R.N.L.I. tractor showing the girder tracks and the grid of the launching platform, which can be raised when not in use.

The tractor has to work on treacherous and difficult ground, from wet sand to thick mud. Wheels would not give a sufficient grip in all conditions, and the machine therefore is mounted on rubber-jointed girder tracks, 18 in. in width, which are driven through a gear-box and clutch.

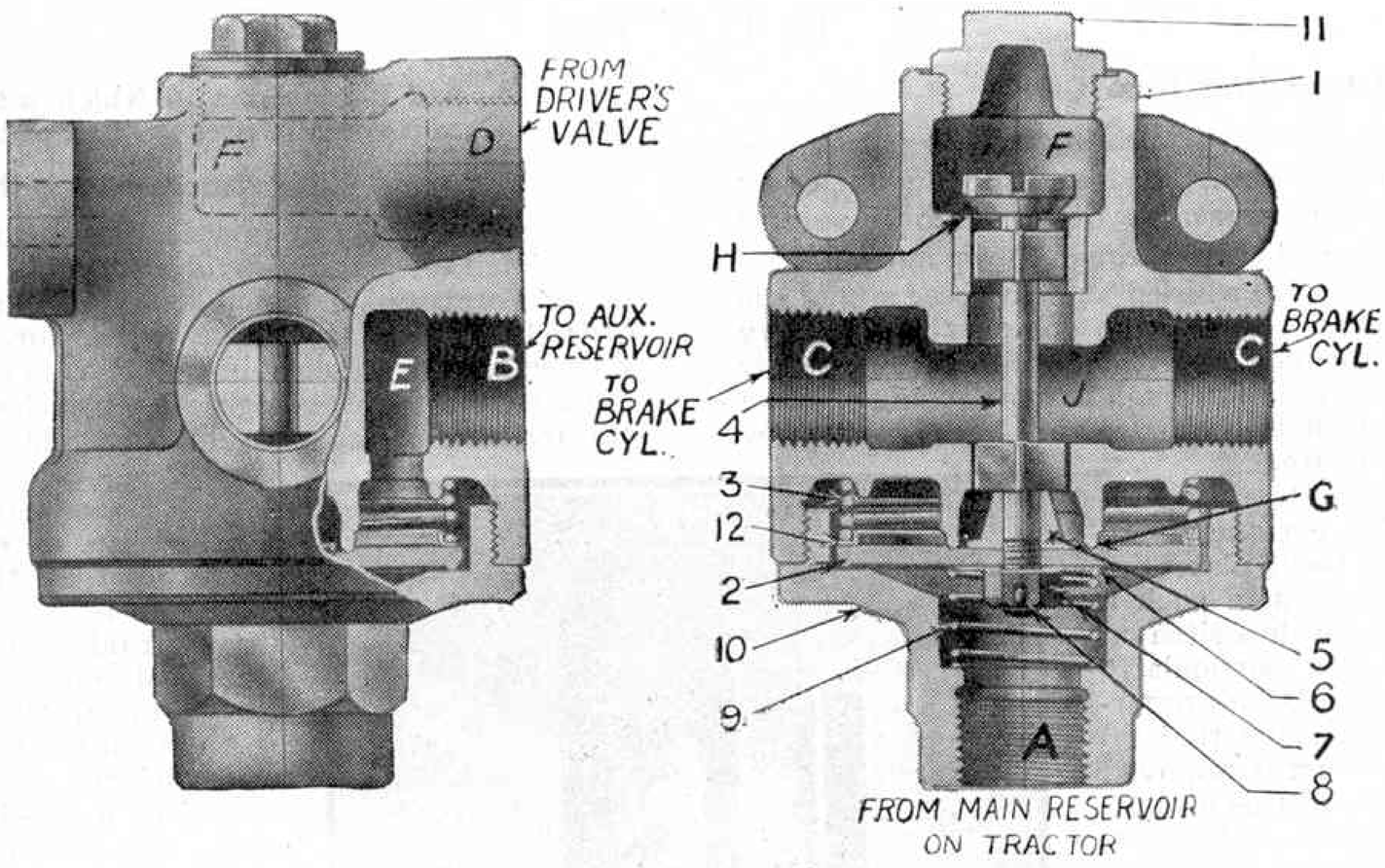
The launching platform and the buffer arrangement for pushing the carriage into the sea to the required depth forms an extension at the front of the main frame of the tractor. A grid is provided for a man to stand on, and when not in use this can be folded back against the radiator.

Automatic Brakes for Trailers

Controlled and Operated by Compressed Air

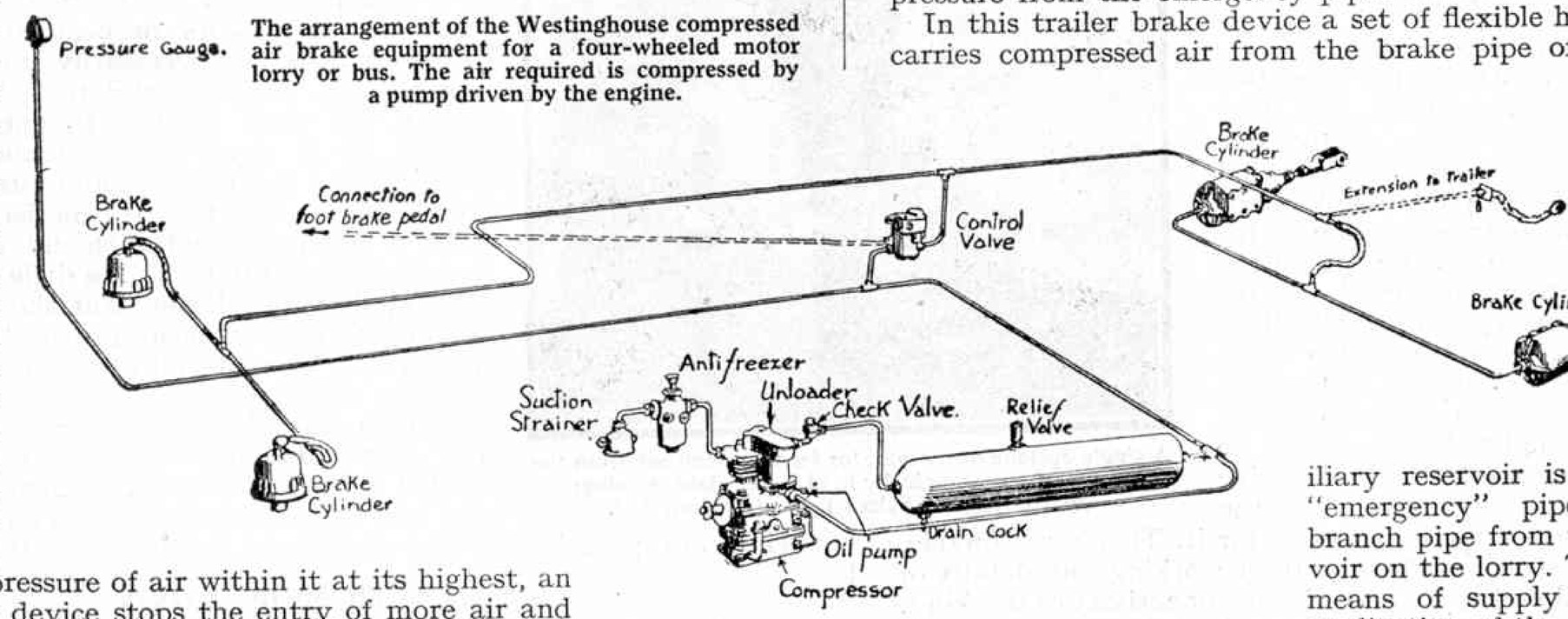
THE brake gear of a modern road vehicle is one of its most important mechanisms. It is not only required to stop the vehicle in which it is fitted, but also must be capable of bringing it to a standstill in a very short distance at a moment's notice in emergencies. Brakes operated by pedals and hand levers usually are fitted in light vehicles, and these are efficient for their purpose, provided they are properly designed and adjusted. Much greater pressure than the muscular power a driver can exert are required on the brake drums of larger vehicles, such as heavy transport lorries and buses, and these usually are fitted with power-operated brakes.

One of the most interesting power brake systems makes use of compressed air. This is the Westinghouse brake, which is suitable for use on vehicles of all kinds. The layout of this brake on a four-wheeled motor lorry is shown in the lower illustration on this page. The air required for the application of the brakes is stored under high pressure in a special reservoir, or air bottle, from which it is released when braking is necessary. It then passes into cylinders, one for each wheel, where it acts on pistons that are connected to the levers operating the brake shoes, and its action is controlled through a valve operated by means of a pedal placed conveniently near the driver's foot.



Sectional diagrams of the Westinghouse automatic emergency valve, which provides means of stopping a trailer if it breaks loose from the lorry hauling it. The working of the valve is explained in this article. Photographs by courtesy of Westinghouse Brake and Signal Co. Ltd.

The reservoir is filled by a compressor that in a motor vehicle is driven either from the gear box or from an auxiliary shaft of the engine. When the reservoir is full, with the pressure of air within it at its highest, an automatic device stops the entry of more air and at the same time relieves the compressor of its load. This device also restarts the action when the pressure drops below an arranged figure, so that a full supply of compressed air is always ready for use. The use of the reservoir is an important feature of the Westinghouse apparatus, for it provides the driver with a reserve of energy upon which he can draw at any moment, even if his engine stalls when going uphill, or in the event of an unintended run-back. A gauge on the instrument board shows at a glance whether the pressure in the reservoir is correct.



The arrangement of the Westinghouse compressed air brake equipment for a four-wheeled motor lorry or bus. The air required is compressed by a pump driven by the engine.

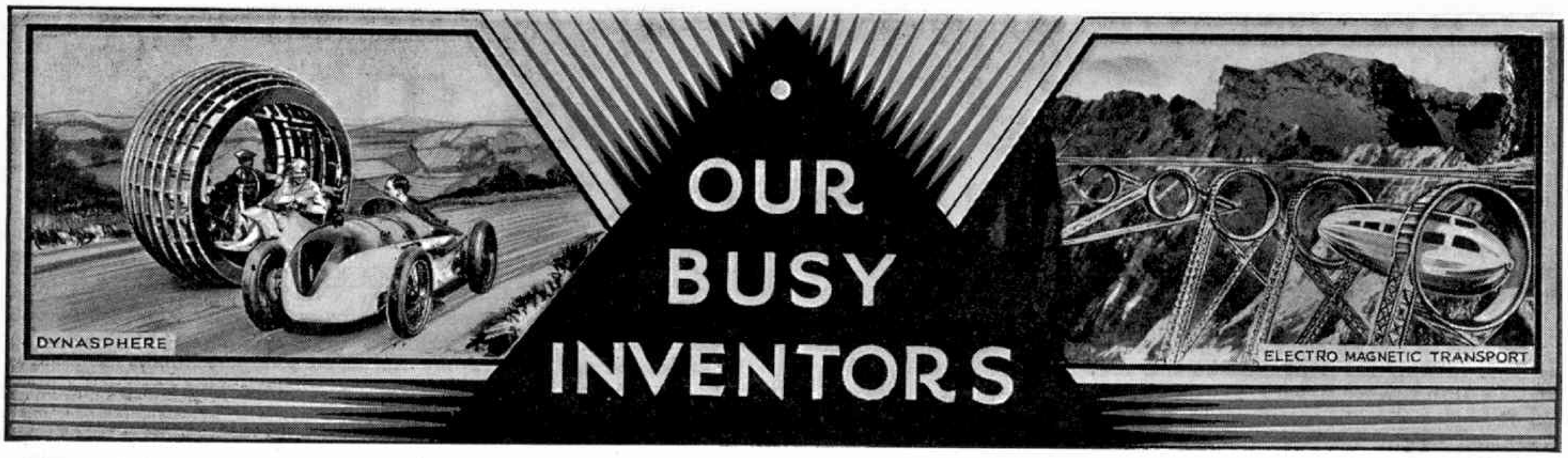
When the driver presses on the brake pedal, the control valve is opened to allow compressed air to pass from the reservoir to the brake cylinders. There it pushes out the pistons connected to the brake levers, and these apply the shoes to the drums. The greater the pressure exerted on the pedal, the greater the force with which the brakes are applied. When the brakes are to be released, the driver simply removes his foot from the pedal. The air in the cylinders then escapes, thus taking the pressure off the brake shoes.

There is no difficulty in fitting this brake to an electric trolley bus, for the compressor can be driven directly from an electric motor supplied with current from the trolley line. An electric governor cuts off the current supply of the motor when the maximum air pressure is reached in the reservoir, and automatically restarts compression when the pressure falls.

The increasing use of heavily loaded trailers behind motor lorries has created the need for a power brake that will keep the trailer under control, and prevent it from overrunning the vehicle ahead of it, and that also will stop it automatically if it breaks away. Westinghouse automatic brake equipment has been introduced for this purpose. It works from the compressed air reservoir of the lorry to which the trailer is attached, and provides a powerful brake that comes into operation immediately the air couplings between the vehicles are parted, or when an accident of any kind causes loss of air pressure from the emergency pipe.

In this trailer brake device a set of flexible hoses and couplings carries compressed air from the brake pipe of the lorry to the fittings on the trailer. A small auxiliary air reservoir and an emergency valve also are included. The auxiliary reservoir is connected by an "emergency" pipe coupling to a branch pipe from the main air reservoir on the lorry. Thus there are two means of supply available for the application of the trailer brakes. One is the compressed air released in the lorry brake pipes when the driver presses the pedal; the other is the air stored under pressure in the special reservoir on the trailer.

The emergency valve is the key to the automatic application of the trailer brakes. Normally a double-action valve allows compressed air from the lorry connection to enter the brake cylinders when the brakes are applied. If the trailer breaks away the valve moves in such a manner that openings through which air could be lost are closed, and compressed air from the auxiliary reservoir then applies the brakes.



By P. A. Tent

Separating Fine Dust from Gases

The problem of removing fine particles of dust from gases is one with which the engineer is often confronted, and the illustration on this page shows an ingenious separator designed to solve this problem. The gases to be purified enter through the opening seen on the left in our illustration and are whirled at high speed round the circular chamber into which it leads. The comparatively heavy solid particles are flung to the outside of this artificial whirlpool by centrifugal action, and there escape through narrow openings into a special compartment in which they settle, and from which they can be removed from time to time.

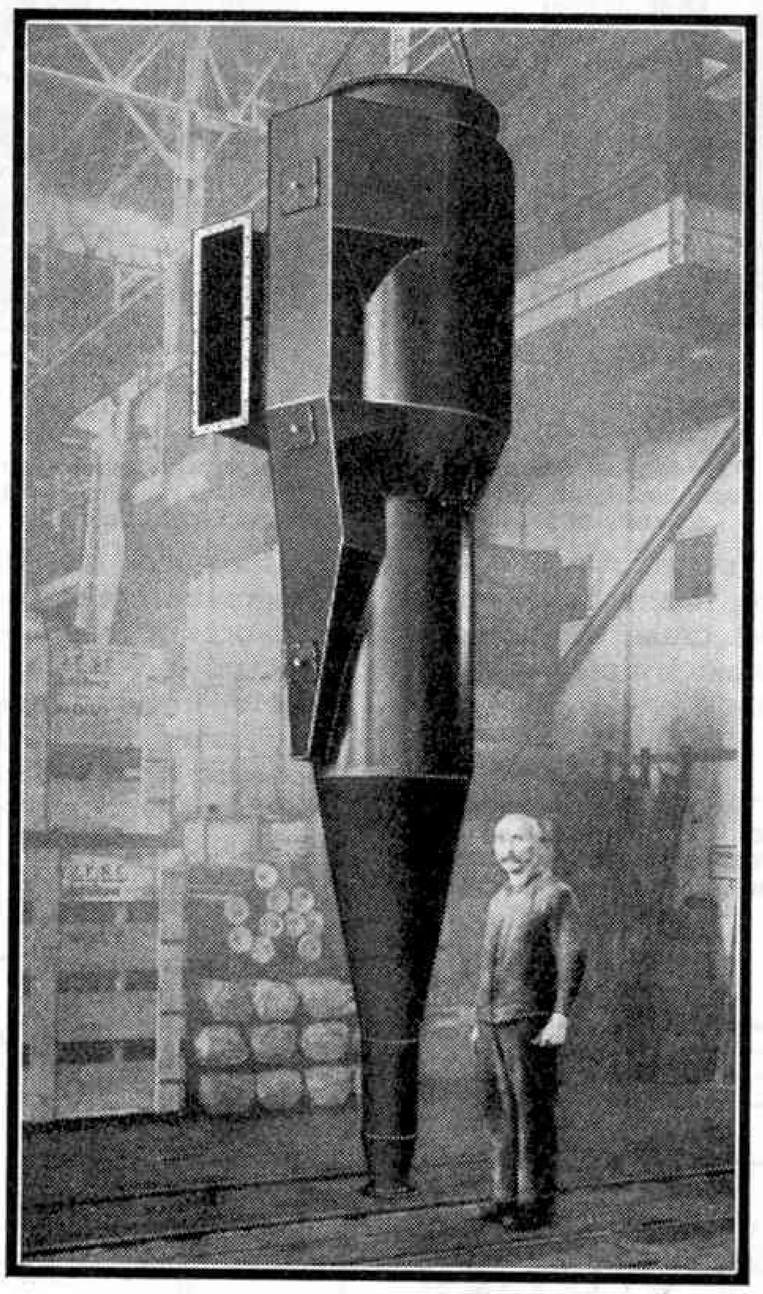
This simple plan is remarkably efficient, but in special cases a double cyclone action is provided, and in addition baffle plates are placed in the path of the gases in such a manner that part of the dust is deposited on them. The double cyclone is particularly useful for gases that contain a large proportion of dust and dirt. Tests show that 90 per cent. of even the finest dust is removed rapidly and easily by the use of this separator, and as much as 99 per cent. of the particles measuring a four-hundredth of an inch or more across is stopped by it.

The separator shown in our illustration is employed to remove fine ash from the gases from a mechanically-fired boiler plant, and is capable of dealing with 7,400 cu. ft. of gas a minute. Other separators of this type are used for taking dust out of gases from cement kilns, and foundries and furnaces of all kinds.

An Inventor's Exhibition

The great event of the year in the inventor's world is the Exhibition organised by the Institute of Patentees. The 12th Exhibition of the series was a worthy successor to its predecessors, and showed that our inventors are as ingenious and enterprising as ever. In his address on opening the Exhibition, Lord Askwith, President of the Institute of Patentees, remarked on the decline in the number of patent applications made for the year ending September 1936, in comparison with the number in the previous year. The drop was from 25,726 to 25,176 and was so slight that it cannot be regarded as evidence of lack of inventive spirit. The President suggested that the increase in employment was responsible for it. This is reasonable, for many of those who would have been working out details of possible patents no doubt have not had time for activity of this kind. It is curious to find that unemployment leads to an increase in inventive activity, in view of the complaint that machines are displacing men in industry.

A feature of the Exhibition was the increase in the number of domestic and labour-saving devices. These included a new electric machine for washing plates and dishes, which rinses them first with hot water and then with cold water before leaving them to dry under cover. Some of the domestic inventions were shown by women inventors. Among these were toasting forks with two or more sets of prongs, a dust-bin with a sliding lid and an adjustable cinder sifter that is particularly suitable for use in flats and large buildings, and a saucepan in which milk falls back into the pan like a fountain when it rises instead of boiling over.



A single cyclone dust separator for removing ash from the flue gases of a mechanically fired boiler plant. Photograph by courtesy of Sulzer Bros. (London) Ltd.

Hand Torch with a Rear Light

Another simple but practical invention that attracted attention was a hand torch that provides a light in the rear as well as the main beam. Torches of this kind should be particularly useful in country districts on roads without paths, for motorists would then be warned of the presence of pedestrians carrying them. In addition there were a two-speed gear for bicycles in which the changes are effected automatically, and a simple fuse box for household use. In the latter a blown fuse is ejected by simply inserting a new one and pressing a button. The device is shock-proof, and will be appreciated by those who are not familiar with electrical gadgets and are perhaps a little afraid of them. Another interesting electrical device was a compact water heater for small houses.

An invention that I noticed is intended to warn drivers of motor cars when they are exceeding a speed of 30 m.p.h. in restricted areas. This does not startle the driver or his passengers by suddenly switching on a light or sounding a bell or buzzer; instead the steering wheel begins to tremble or shiver in his hands when the maximum speed is reached, and his natural impulse on feeling this is to slow down. Thus he keeps within the limits allowed without any conscious effort on his part.

Who Are Our Inventors?

I have previously commented on the fact that the daily work or occupation of an inventor does not necessarily influence his ideas. This year's Exhibition has again shown the truth of this. Inventors represented in it range from auctioneers and architects to butchers, schoolmasters, doctor and company directors. It is perhaps natural that a hotel proprietor should invent an improved cash till, but it is a little surprising to find that a coal merchant should invent an insect trap, an insurance broker should produce a loom darning appliance, and a vinegar maker should be responsible for apparatus to indicate the speed of a motor car. The wide range of occupations represented in the Exhibition is a further proof of the fact that man above all is an inventive being, always thinking and striving to produce new things.

Lenses to Fit on the Eyeball

An invention that promises to be a real boom is the contact eye lens, which is fitted to the shape of the eyeball and worn under the eyelids. A pair of these serve the same purpose as eyeglasses or spectacles, but are far more efficient and less unsightly. They are also safer, for they are protected naturally by the eyelids. They are therefore practically unbreakable and may be worn by people without danger taking part in games. An instance is on record in which the face of a man wearing contact glasses was badly torn in a motor car accident, while his eyes were uninjured.

The idea of contact eye lenses is by no means a new one. They were suggested 100 years ago, but it is only recently that

improvements in the art of grinding lenses have made them practicable. They take a little more time to adjust than ordinary spectacles, but are comfortable to wear once the correct curvature and fitting have been secured, and provide complete correction for various defects of vision. One particularly interesting advantage they possess is that as in effect they form part of the eye itself, they do not reflect stray light into the eyes of their wearers.

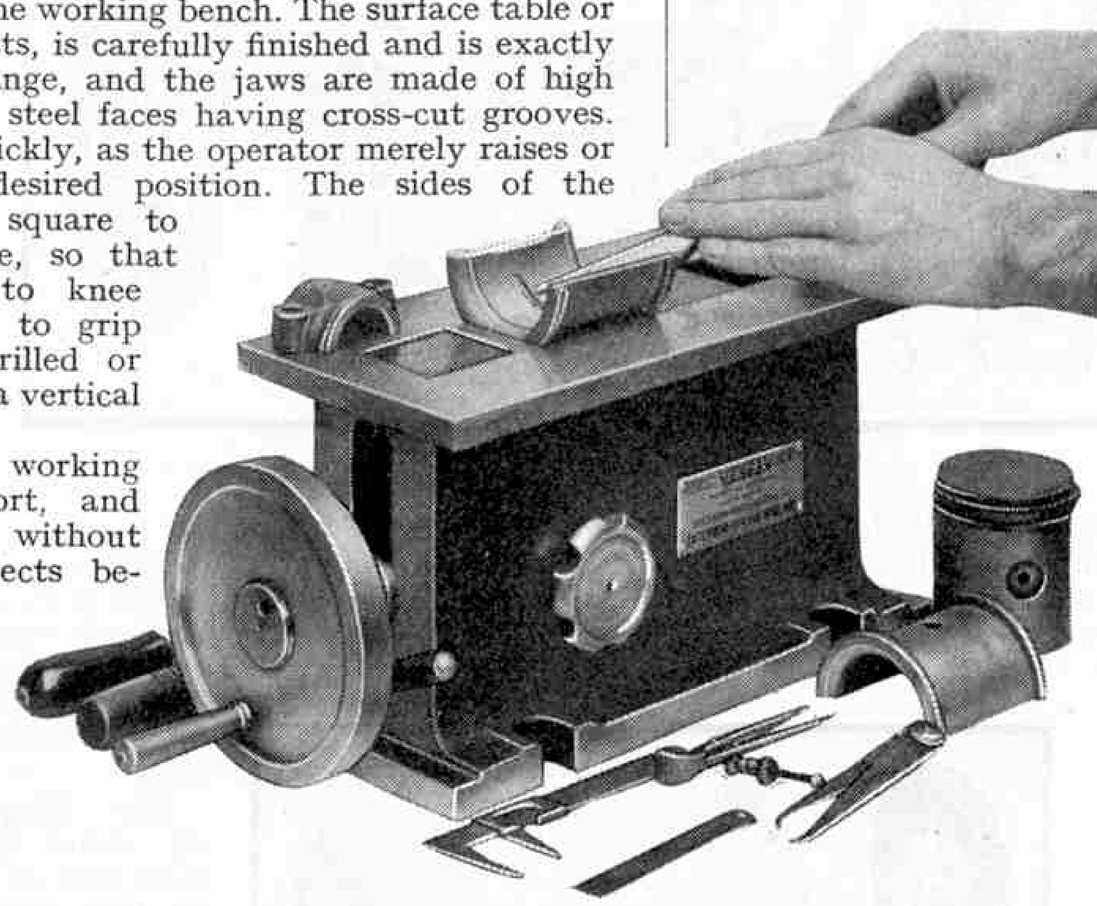
A New Idea in Vice Design

The vice is one of the fundamental tools of the engineer, and while many changes have been made in its design, either to improve its working or to adapt it to special uses, revolutionary alterations have been rare since it came into general use. The new vice shown in the lower illustration on this page marks a distinct break. It is known as the "Versa Vice" and its important feature is that the work it holds rests upon a solid platform. The jaws therefore have merely to hold articles in position instead of having to grip them tightly enough to support their weight.

As the illustration shows, the jaws of the vice work in slots in a body that has a smoothly machined top. They are closed and opened by means of a hand-wheel, which acts in the same manner as the usual hand lever of an ordinary vice. Unlike the jaws of the latter, however, they can be raised within certain limits to any convenient height above the top of the body, so as to accommodate work of different sizes. The height is regulated by the use of a knob that is provided with projections to enable a good grip to be obtained.

The body of the vice is a rectangular cast steel box with flanges for bolts to hold it down to the working bench. The surface table or plate, on which the work rests, is carefully finished and is exactly parallel with the bottom flange, and the jaws are made of high tensile steel, with hardened steel faces having cross-cut grooves. Work can be set up very quickly, as the operator merely raises or lowers the jaws to the desired position. The sides of the body also are machined square to the base and surface plate, so that the vice can be bolted to knee plates to enable the jaws to grip shafts that have to be drilled or otherwise machined when in a vertical position.

The combination of a working table that provides support, and jaws that grip securely without straining or distorting objects between them, makes the Versa Vice one that can be used not only by engineers for all classes of work, but also by jewellers, watchmakers, engravers and electrical instrument makers. The most delicate electrical instruments and even watches can be held firmly in position for work to be done on them without damaging them in any way by the pressure of the jaws.



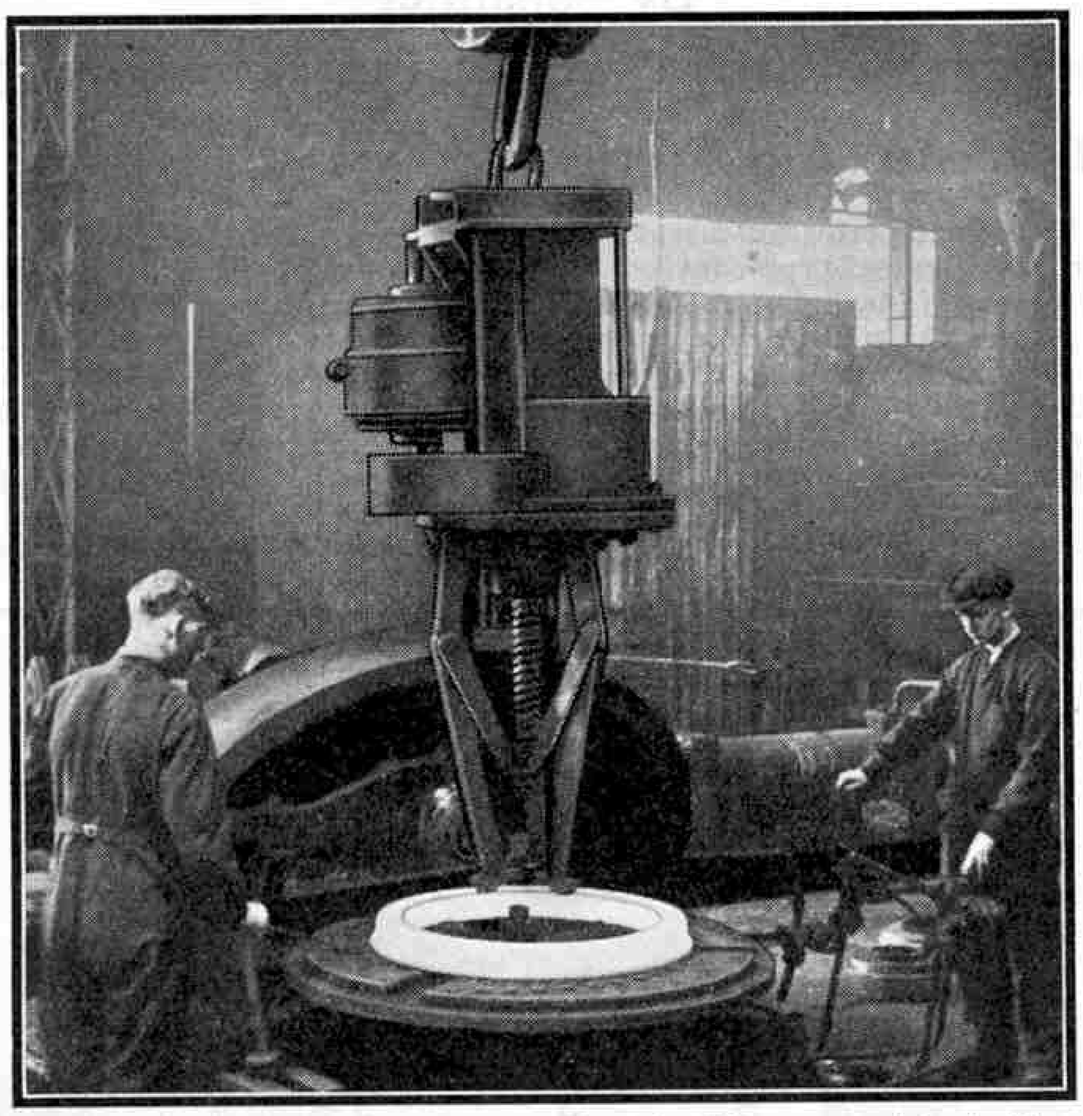
The Versa Vice in use in a motor garage. The jaws of this vice merely hold work in position instead of gripping it tightly enough to support it. Photograph by courtesy of William Frost and Company, Newcastle-upon-Tyne.

An Electric Lifting Dog

The ingenious lifting dog shown in the upper illustration on this page is designed for handling steel tyres rapidly and easily, whether they are hot or cold. It is electrically driven and is suspended from an overhead crane, its operation being controlled from the crane cage. It has three lifting links, which are expanded and contracted by levers operated by a central screw, which is driven through reduction gearing by an electric motor. A shock-absorbing clutch is fitted so that no damage is done to the working parts when the dogs come into contact with the tyre that they are about to lift, and a permanent resistance included in the motor circuit prevents injury of any kind due to overloading when contact is made.

The dogs have double heads, so that they can grip a tyre either on the outside or on the inside, and they automatically centre themselves. The machine is very precise in its action, and is used not only for handling the tyres as they come from the mill, but also for stacking them.

Sometimes it happens that a stack of tyres is built up askew. It is then easy to straighten out the pile by simply lowering the lifting dogs inside it, extending them to come into contact with the lowest tyre, and then winding them out.



An ingenious tyre lifting dog that is used both for lifting tyres and for stacking them. Photograph by courtesy of Joseph Booth and Bros. Ltd., Rodley.

Fighting Waterfront Fires

Fire fighting is a field in which the inventor is always at work, either to speed up the attack on a fire in order to prevent it from securing a firm hold, or to extinguish it more quickly and with less damage from water. The difficulties of approaching fires also is in the mind of inventors, and in Oregon, in the United States, trials have been made of a device to enable firemen to cope with burning warehouses or other buildings alongside docks, which often set firemen difficult problems. This takes the form of a small metal boat, about 3 ft. in length, equipped with an electric pump that throws a powerful jet of water through a nozzle in its deck. Another jet below the waterline propels the boat, which carries no crew, but is controlled from a distance. The rudder is guided by means of ropes or cables so that the boat can be directed to any position, from which good use can be made of its fire-fighting jet.

A Gramophone Improvement

I was interested to find that the Columbia Graphophone Co. Ltd. are now making records with a twelve-sided hole in the centre, instead of the circular one that until now has been universal. The purpose of this change is to make sure that the records will not slip. Records played on automatic radiograms have a tendency to do this; and the pitch varies, and the tone of the reproduction is spoiled, if there is a slip of only a fraction of an inch. The new form of centre hole has overcome this difficulty completely, and the records incorporating it can be played with precision and perfection of tone.

Developing Fingerprints

Inventors join in the campaign against crime in many forms, and chemical knowledge was used by one in America who has worked out an interesting method for developing fingerprints. These usually are detected by dusting suspected articles with a powder that adheres to surfaces which have been made slightly greasy by the pressure of a finger or thumb. Prints on polished table tops and on certain other kinds of surface cannot readily be made visible in this manner, but the new method is successful in the most difficult cases.

The plan followed is to blow iodine fumes over the surface to be examined. This is easily done by means of a small glass vessel containing glass wool. On blowing down a rubber tube fitted at one end of this vessel, iodine fumes are blown out at the other, and the quantity can be increased by warming the tube with the hand. When a print is found a small sheet of silver is pressed against it for a few seconds and then exposed to sunlight. When this is done the iodine print is transferred to the silver, on which it can be preserved if it is protected from a strong light.

Meccano Suggestions Section

By "Spanner"

(365 and 366) Two Meccano Torsion Springs (A. Allen, Swansea, and W. Forbes, Newcastle)

Motor car engineers have recently brought to perfection a system of springing that is entirely different from the leaf-type cantilever and semi-elliptic springs usually incorporated in both light cars and heavy commercial vehicles. In this system the springs, instead of making use of compression forces, depend for their working on torsional strains, and it is claimed that they are considerably cheaper to fit and more reliable in operation. There are certainly fewer moving parts under strain, but unavoidable complications are nevertheless necessary in other directions.

As is the case in many other branches of engineering, Meccano model-builders have kept up to date, and as will be seen from Figs. 365 and 366, A. Allen (Swansea) and W. Forbes (Newcastle) have built excellent reproductions of the latest additions to motor car engineering. These are both back-axle torsion springing arrangements, but the first is for rear wheel drive and the second for front-wheel drive cars. A. Allen, who submitted the first model, has made good use of Boiler Ends and Universal Couplings in reproducing one of the first torsion sprung rear-axles ever applied in actual practice. The differential of this gear is identical with that fitted in the Motor Chassis, Super Model Instruction Leaflet No. 1a, and the complete assembly can readily be incorporated in that model. A Coupling 1 carries the inner ends of a 2″ and 1½″ Rod. Each of these Rods has bolted to it a ¾″ Contrate Wheel, one of which is indicated at 2, and in addition the 2″ Rod has loosely mounted on it a 1½″ Contrate 3. This last part carries two 1″ Threaded Rods that are locked in opposite holes by means of two nuts each. The outer end of each Threaded Rod has screwed on to it a Collar, and when both of these are in position a short Rod is passed through their plain holes and also through the centre plain hole of the Coupling 1. Grub-screws are used to lock this short Rod in position in the Collars.

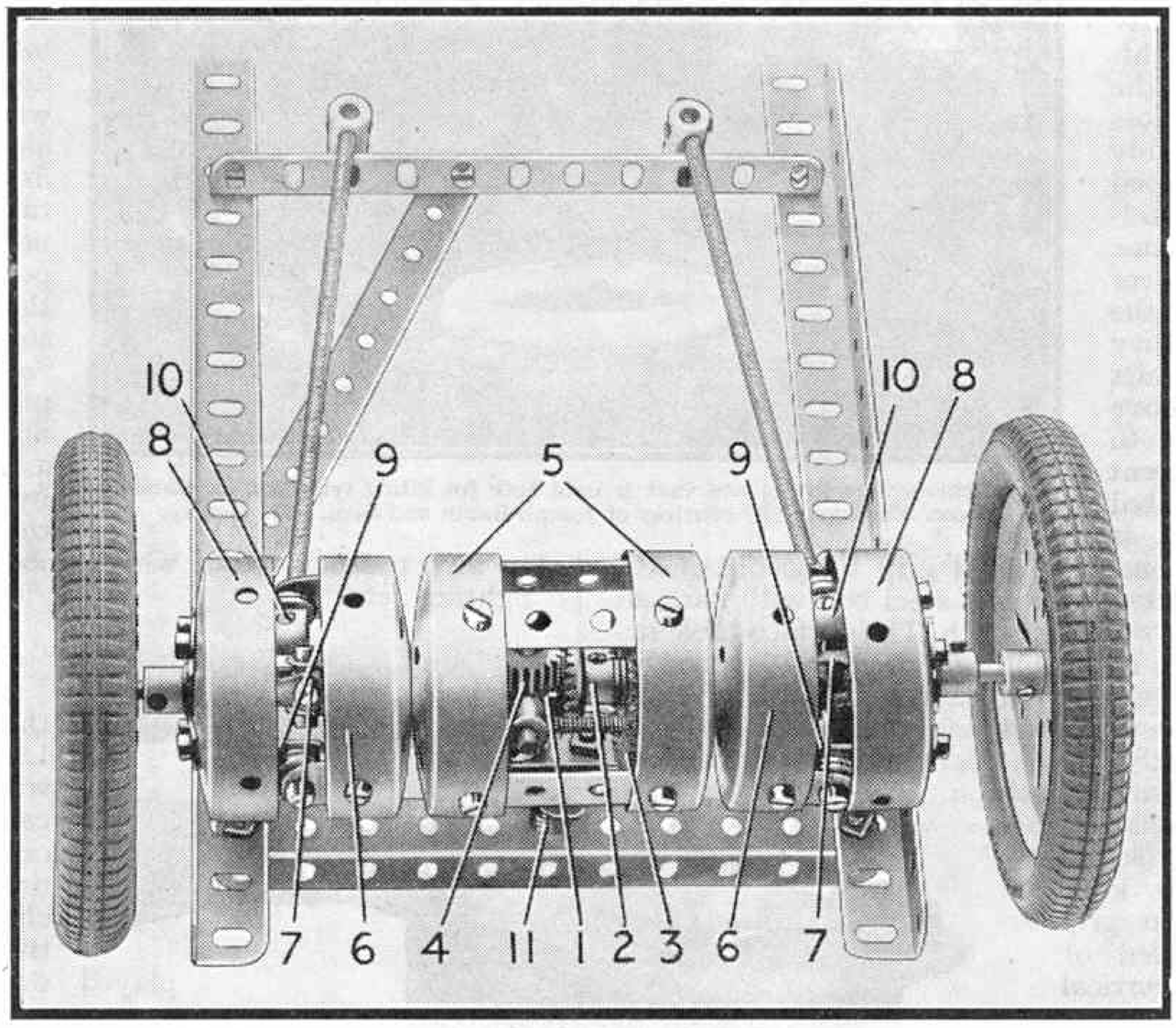


Fig. 365

Two ¾″ Pinions 4 are now added, and these are free to rotate on Pivot Bolts that are screwed into opposite tapped holes of the Coupling 1. These Bolts are screwed into the Coupling until they grip the Rod passing through the centre plain hole.

The complete differential gear is enclosed by two Boiler Ends 5 that are joined together by means of three 2″ Strips. Two further Boiler Ends 6 are now passed over the 2″ and 1½″ Rods already mentioned, and are kept in position by securing the ends of two Universal Couplings on their extremities. These Couplings are shown at 7 in Fig. 365. Two 1″ × ½″ Angle Brackets are now bolted to each of the Boiler Ends 6, and are pivotally attached to further Flat Brackets on the Boiler Ends 8. These last-mentioned Angle Brackets, indicated at 9, are linked up to the Flat Brackets on the Boiler End 6 by ⅜″ Bolts on the shanks of which are carried three Nuts and two Washers. On the opposite side of each Boiler End 8 to the 1″ × ½″ Angle Bracket, a Threaded Coupling 10 is fitted, and in the end plain hole of this part is gripped a 6″ Threaded Rod. Two Grub-screws are used for this purpose, and if the springs are intended to support a great weight, flats must be filed on the end of the Threaded Rod.

The unoccupied ends of both Threaded Rods are gripped in further Threaded Couplings as shown, and these Couplings are fixed by means of ⅜″ Bolts to a transverse Girder bolted to the main frames of the chassis. At this end of the Threaded Rod flats must be filed if heavy loads are to be supported.

The outer ends of the Universal Couplings 7 carry 1½″ Rods that are journalled in the bosses of Double Arm Cranks bolted to the Boiler Ends 8. The outer ends of the Rods carry the Road Wheels. One of the 2″ Strips of the differential casing has secured to it two 1″ Triangular Plates, the outer holes of which accommodate ½″ Bolts. By means of these Bolts the differential casing is attached to two transverse Angle Girders of the chassis frame, and on their shanks two Collars are placed for spacing purposes. These Collars are indicated at 11.

The second torsion spring arrangement, submitted by W. Forbes, is shown in Fig. 366. This is a much simpler arrangement than that just described, and as already mentioned it is only suitable for front-wheel drive chassis. The main frames of the chassis are bridged at their rear ends by a channel section girder, the end holes of which carry securing bolts for the Socket Couplings 1. Each of these Socket Couplings accommodate a Coupling 2 as shown, and this latter part is free to rotate. In its longitudinal bore is gripped one end of a short length of Hornby Control Wire. Both ends of this wire must first be flattened slightly by hammering, and its inner end is gripped tightly in a Collar 4. This Collar is attached to the channel girder by means of a bolt.

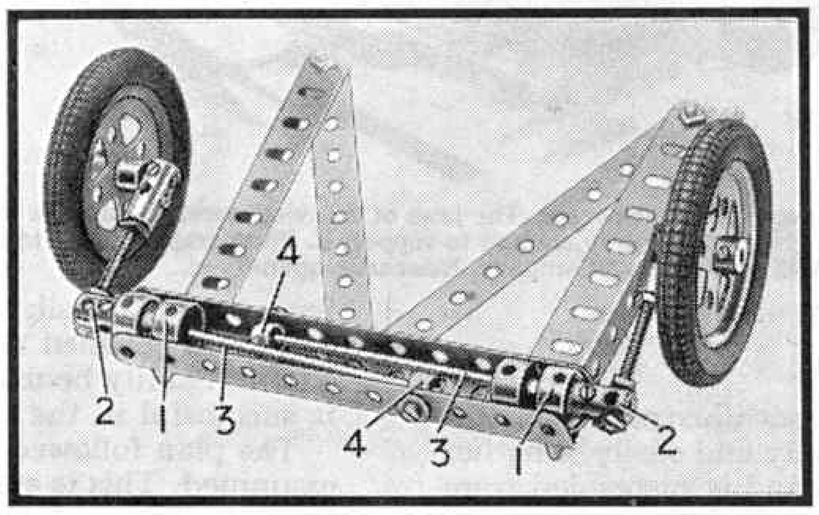


Fig. 366

The Coupling 2 has screwed into its outer tapped hole a 2″ Threaded Rod that is locked in position by means of two nuts. The unoccupied end of the Threaded Rod has passed on to it a locking nut and a Threaded Coupling, which are turned in opposite directions on the Rod until they grip each other securely. A short Rod is mounted in the end plain hole of the Threaded Coupling, and on this the road wheel is free to rotate. The wheels are held on the Rods by Collars and are spaced from the Couplings by Washers so that they run smoothly.

In actual practice the mechanism is entirely enclosed in a strong steel tube, and if in the Meccano model it is desired to follow this plan as closely as possible, the frame can be closed by means of a third Angle Girder, which would cover the Rods 3.

(367) Automatic Overload Release (K. Anderson, Birkenhead)

In actual practice most cranes are fitted with a mechanism that makes it impossible to lift a load greater than that for which the crane was designed. These overload mechanisms vary considerably in design and application, and a model of one type, shown in Fig. 367, was recently submitted by K. Anderson (Birkenhead). This model is simple to construct, and is suitable for fitting into any fixed radius jib crane and gantry crane. It is not suitable for cranes capable of operating at varying radii, because no compensation to equalise load and radius is incorporated. The framework consists of three $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates bolted together in the manner shown in the illustration. The two Plates that are arranged vertically are bridged at their upper ends by two $2\frac{1}{2}''$ Strips.

The driving shaft 1 carries a 1″ Sprocket Wheel and a $\frac{1}{2}''$ Pinion 2, this last part meshing with a 57-teeth Gear wheel 3 that is free on the Rod 4. This Gear is spaced away from the framework by a Collar, minus grub-screw. On the outer end of the Rod 4 is mounted a 1″ loose Pulley with Dunlop Tyre, and also a Bush Wheel 3. The Bush Wheel is gripped on the Rod and is held against the Dunlop Tyre by half a Compression Spring 6. A spring loaded clutch is formed in this way between the 57-teeth Gear 3 and Bush Wheel 5.

A Worm 7, on the end of the Rod 4, meshes with a $\frac{1}{2}''$ Pinion on a Rod 8, and this carries a 1″ Sprocket Wheel that is connected to the winding barrel of the crane. When the Sprocket on the Rod 1 is rotated in an anti-clockwise direction, when looked at from the mechanism side, the driven shaft 8 is turned in a similar direction. If a load is placed on the shaft 8, the worm 7 tends to screw itself round its $\frac{1}{2}''$ Pinion, and this slides the Rod 4, thus disengaging the clutch. The clutch may be held in its disengaged position by the Pawl 9.

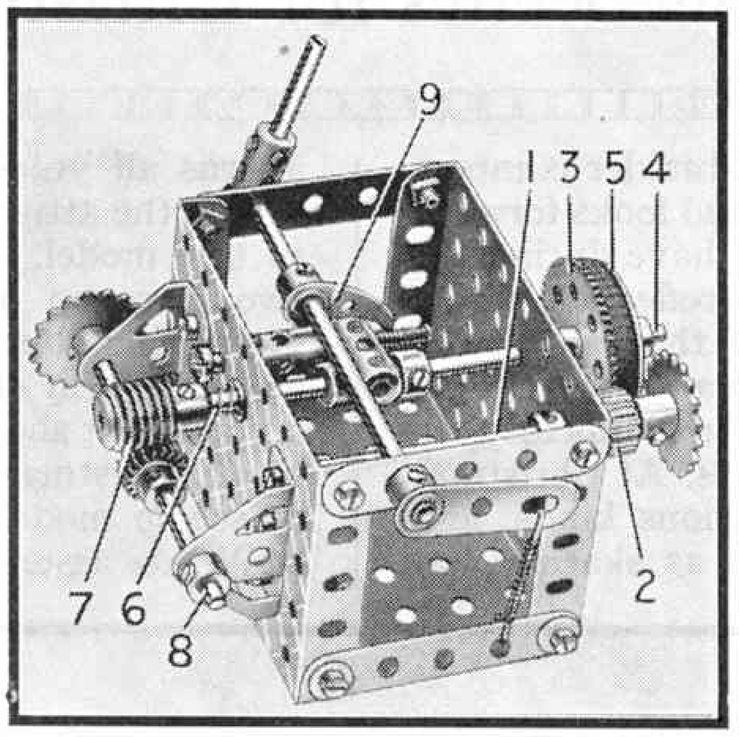


Fig. 367

(368) Simple Constantinesco Gear (A. W. Marshall, Kings Lynn)

On two previous occasions Meccano models of the Constantinesco Torque Converter have been described in the "*M.M.*," but both of these were fairly complicated and made use of a considerable number of Meccano parts. They were therefore beyond the scope of many model-building enthusiasts. Mr. Marshall (Kings Lynn) has now designed a successful clockwork operated gear of this type, and as will be seen from Fig. 368 it is extremely compact.

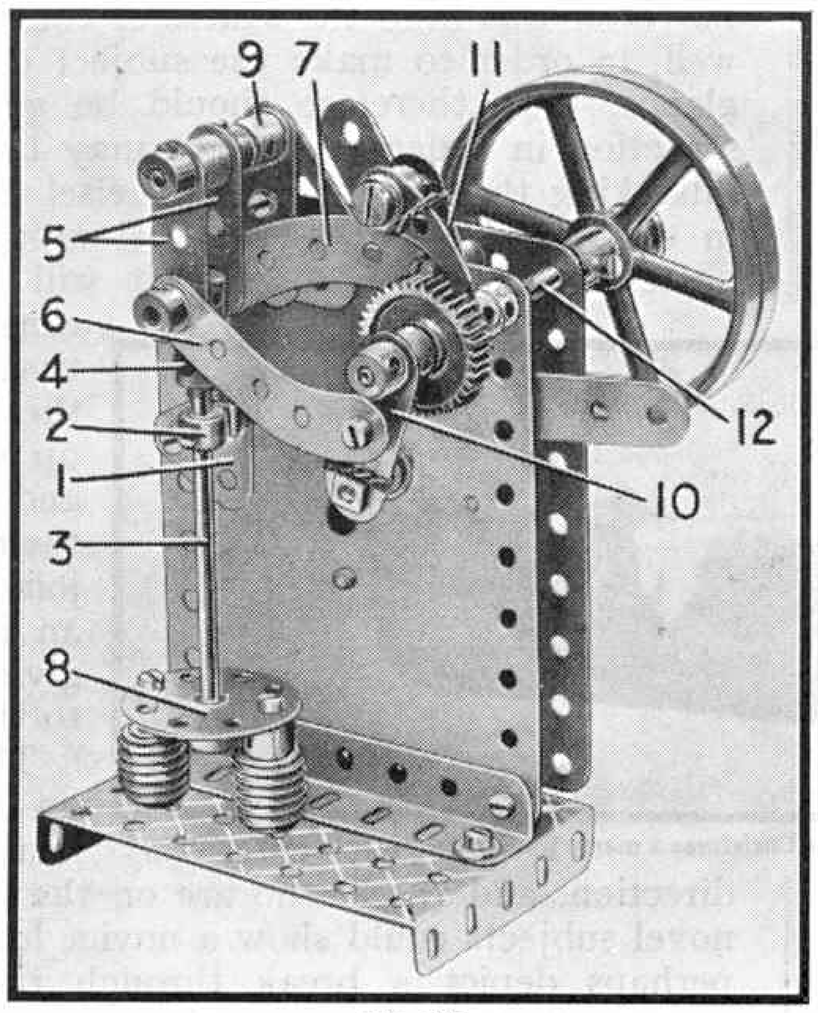


Fig. 368

A No. 2 Clockwork Motor is attached by a $3\frac{1}{2}''$ Angle Girder to a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the base. The driving spindle of the Motor carries a Coupling that is mounted in position by passing the spindle through a centre plain hole. This part forms a crank, and in one of its end tapped holes is screwed a $\frac{3}{8}''$ Bolt. This Bolt is locked in position by a Nut, and carries on its shank three Washers for spacing purposes and also a 1″ Triangular Plate 1. One hole of the Triangular Plate accommodates a 7/32″ Bolt, the shank of which is screwed into one of the threaded holes of the Collar 2.

The Rod 3 on which the Collar 2 is secured is gripped at its upper end in the longitudinal bore of a Coupling 4, that is pivotally mounted on a 1″ transverse rod. Two $1\frac{1}{2}''$ Strips 5 are mounted on this Rod, together with the ends of two $2\frac{1}{2}''$ large radius Curved Strips 6 and 7. These four Strips are secured in position by means of two Collars as shown in the photograph. The lower end of the Rod 3 has mounted on it a Bush Wheel 8 that forms a support for two Worms that are held in position by means of $\frac{3}{8}''$ Bolts.

The upper holes of the $1\frac{1}{2}''$ Strips 5 carry a $1\frac{1}{2}''$ Rod, and on this Rod, between the $1\frac{1}{2}''$ Strips, are mounted eight Washers. Two Collars are next added, and one end of the $1\frac{1}{2}''$ Rod is gripped in the boss of a Crank 9. This Crank is bolted to a Flat Trunnion that in turn is bolted to one of the side plates of the Motor. Each end of the Strips 6 and 7 is lock-nutted to a Crank. The two Cranks are indicated at 10 and 11, and both bosses of these parts point inward towards the Motor. They are arranged on opposite sides of a 1″ Gear that is free to turn on the driven Rod 12.

(369) Off-Set Pawls

(A. Smiler, Leicester)

One of the difficulties associated with ratchet-operated mechanisms in Meccano models is that of obtaining a very small rotary movement for an equally small reciprocating movement of the driving mechanism. This can be overcome to a great extent by making use of large diameter Gears, having a great number of teeth, but unfortunately the necessary space is not always available. This problem has been solved successfully by A. Smiler (Leicester) who has conceived the idea of using two or more off-set Pawls. A simple two-pawl arrangement is shown in Fig. 369 and no doubt many Meccano model-builders will find use for the idea.

A Ratchet Wheel is mounted, together with two 2″ Strips, on the driving shaft, and the unoccupied ends of the Strips are joined together by a 1″ Threaded Rod. This Rod has locked on it two Flat Brackets, each of which forms a connecting point for a Pawl, without boss. This Pawl is mounted on a lock-nutted bolt, and is held in contact with the Ratchet Wheel by means of a short length of Spring Cord. One end of the Spring Cord passes through the unoccupied hole of the Pawl, and the other end is fastened round the 1″ Threaded Rod already mentioned. By sliding the lock-nutted bolts carrying the Pawls in the slotted holes of the Flat Brackets the tips of the Pawls can be off-set for half the distance between two teeth of the Ratchet Wheel.

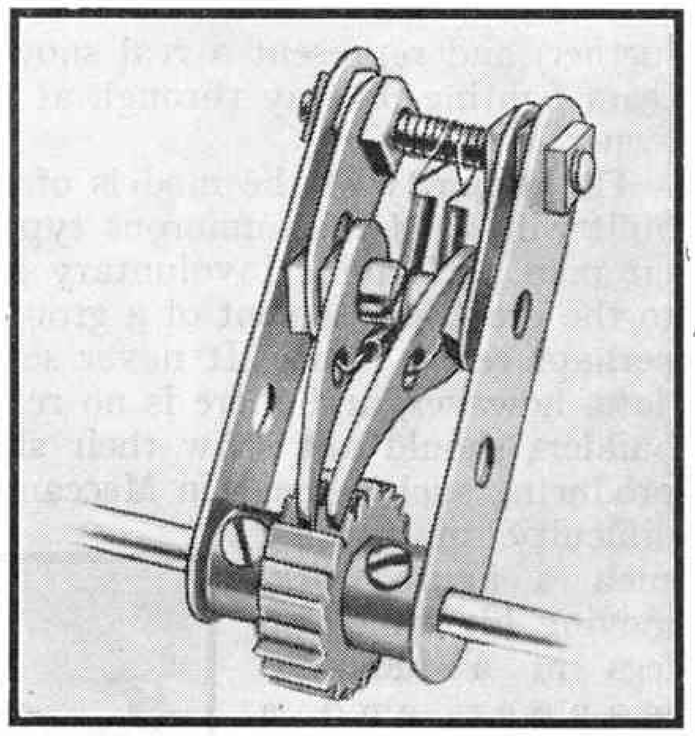


Fig. 369

(*Continued from previous column*)

of each Crank is fitted with a Pivot Bolt, lock-nutted in position and carrying on its shank a Pawl. This Pawl is held in contact with the 1″ Gear already mentioned by means of a light spring or short length of elastic.

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

M.192. M. Howes, Stockport, has discovered that a 2″ Tyre mounted on a 2″ Pulley, forms an admirable gear wheel when used in conjunction with a $\frac{1}{2}''$ Pinion. The treads of the Tyre are the exact pitch of Meccano Gears and form good teeth for light drives.

In Search of New Models

Snow Scenes for Christmas

AT this time of the year every model-builder is intent on the joys of the Christmas season, and looks forward eagerly to the good time he is going to have during the holidays. His thoughts of course are reflected in his model-building, and it is only natural that he should search for subjects that seem in some way to be closely connected with Christmas. There is no difficulty in building up novel and interesting models. At Christmas we always think of snow scenes of various kinds, and our minds turn to winter sports, such as skating and sledging. These of course figure largely among our Christmas models, and although the season is traditionally a merry one, there is no reason why the model-builder should not even go further, and represent a real snow blizzard, with a dog team fighting its way through at the command of their owner.

The majority of the models of this kind that will be built will be of the humorous type. The old joke of the fat man performing involuntary gymnastics on a slide, to the great amusement of a group of small boys, is not perhaps really funny. It never seems to become out of date, however, and there is no reason why keen model-builders should not show their skill and ability by reproducing such a scene in Meccano. There should be no difficulty in making such a figure work, moving his arms and legs in a ludicrous manner, and a successful model of this kind will always interest and amuse all who see it.

Christmas of course is never complete without a yule log! In the lower illustration on this page we show a reproduction in Meccano of the traditional countryside task of bringing in the log that is to give a cheerful blaze, and thus do its share towards increasing the happiness of everyone. The log shown of course is too large for the boys who are trying to haul it along, but that does not matter very greatly in a pictorial model such as this.

A boiler covered with brown paper forms a good log. The short branches can be moulded in plastic wood, but if this material is not available, putty, wax or some similar substance will do quite as well. Thick white paint is used to represent the snow, which of course necessarily adorns all yule logs, according to Christmas tradition.

It is the attitudes of the two figures that give character to this model. A mere reproduction of a large log with two Meccano figures standing beside it would not be interesting, but the scene becomes attractive as soon as some form of motion or action is introduced. This is a point that should be kept in mind in making miniatures of all Christmas scenes, and indeed in a very wide range of scenic models.

We are assuming that there will be snow at Christmas, and if there is real Christmas weather there also will be skating. This immediately suggests excellent subjects for model-building, for there is real life and grace in the movements of a skater, and this acts like a challenge to the model-builder to reproduce it.

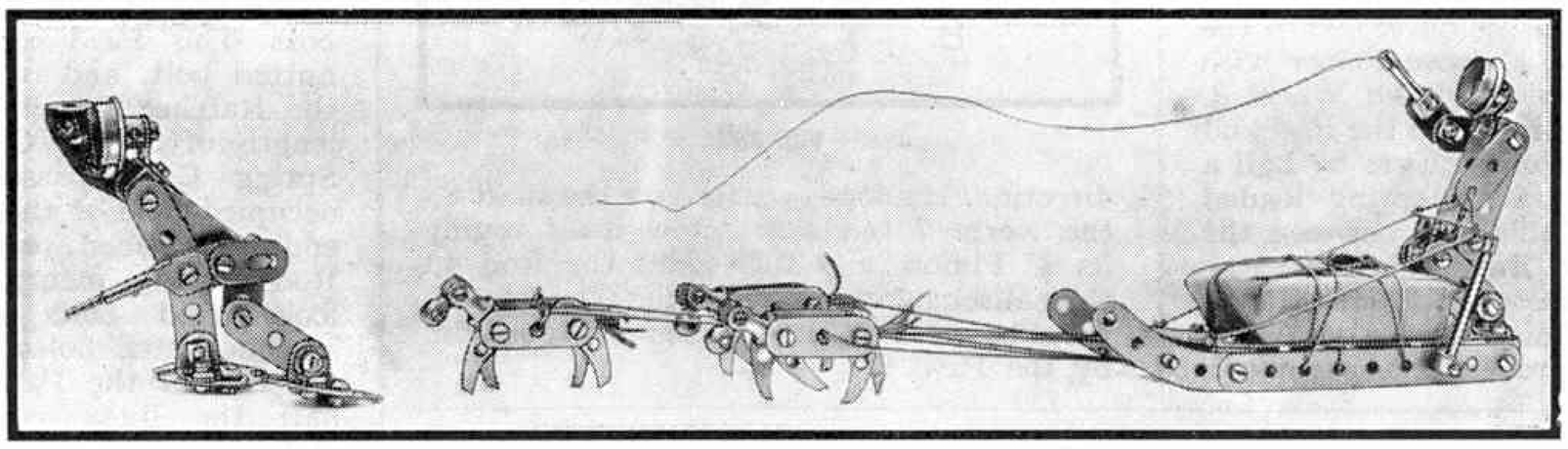


Fig. 1. A Meccano impression of an Alaskan dog team fighting its way through a blizzard. The attitudes of the figures and the dogs play an important part in obtaining the right effect.

The upper illustration on the opposite page is an excellent example of a skating scene in Meccano. In a model of this kind the skates of course should show up well, in order to make the subject clear at the merest glance. Care therefore should be given to their construction in order that there may be no possibility of mistaking them for something else! Each of the skates in the model shown is made from two Pawls without bosses, Part No. 147C, and it will be seen that this construction is effective. The bodies of the skaters are built up of Curved Strips, and the way in which their arms have been joined together plays an important part in giving life and vigour to the scene.

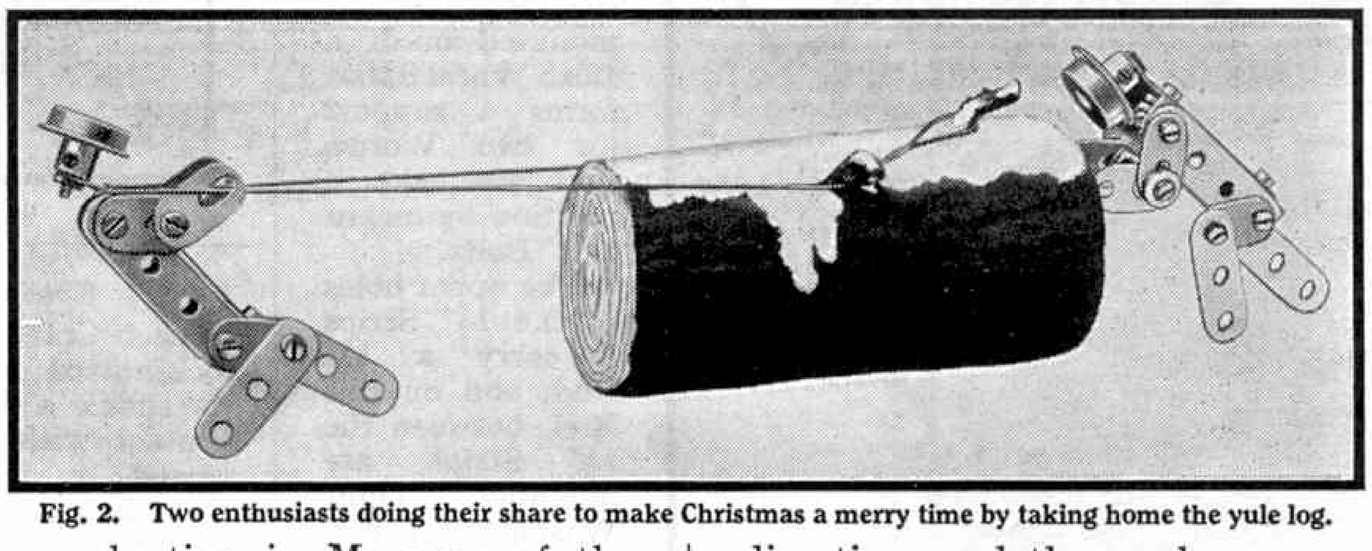


Fig. 2. Two enthusiasts doing their share to make Christmas a merry time by taking home the yule log.

This model is only an illustration of what can be done in this direction, and those who are on the look out for really novel subjects could show a novice learning to skate, or perhaps depict a break through the ice, with some skaters disappearing into the water and others falling in various ungraceful attitudes.

Sledging is as useful as skating to the model-builder in search of scenes of life and action. It is not necessary to go into details on how these should be constructed, for models of this kind have already been described in the *"M.M."* and model-builders themselves will have no difficulty in reproducing features of sledges of various types with which they are familiar.

The representation of sledges can be extended to include models similar to that shown in the upper illustration on the opposite page. This of course is serious sledging work, and not mere fun. The dogs hauling a heavily-laden sledge have an arduous task, especially if the snow over which they have to pass is soft. Then the sledge drags, their feet sink deep into the snow and they strain hard at the traces as they try to make good time.

The model illustrates these features well, and also suggests that a severe snowstorm is raging, for the man in the foreground is seen to be leaning forward as though he is struggling against a blizzard. The required attitude is given to the figure of the driver by adjusting the position of the legs and his right arm. One hand is raised to his brow in what is evidently an attempt to shield his eyes from the bitterly cold wind and clouds of drifting snow-flakes.

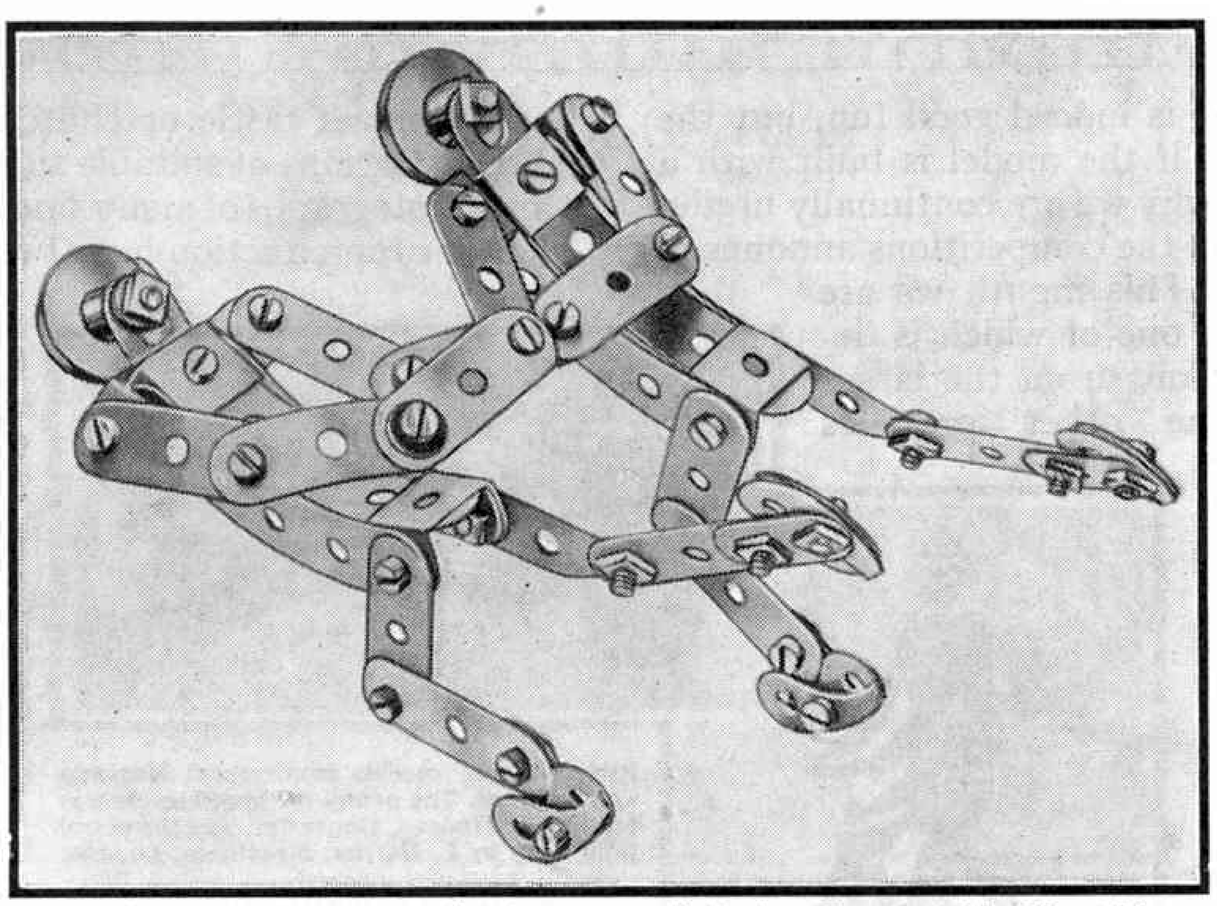


Fig. 3. The speed and grace of skaters on smooth ice is well suggested in this model.

The sledge and the stance of the man behind it are equally well portrayed, and play their part in completing the picture. The load on the sledge and the whip lash are the only parts of the model that are not Meccano parts. The former is simply a bundle of paper and the lash is a piece of stout copper wire.

The reindeer and sleigh that forms the subject of the model shown in Fig. 4, represent a more pleasurable form of sledging. The scene is typical of northern Europe, and the weather conditions are better than those of the model previously described. Reindeer are not familiar creatures outside Lapland, and model-builders can only work from photographs in trying to reproduce scenes in which they take part, but so many photographs have been reproduced in books and magazines that this offers no difficulty.

The sleigh is totally different from that used in northern Canada and Alaska. It can be readily distinguished by its large curved runners, and in the model it will be noticed that these form one of the main features. The only part of the model that cannot be reproduced with ordinary Meccano parts are the antlers of the reindeer, and as these must be copied fairly accurately to obtain the right effect, it is permissible to use wire or some other non-Meccano part. In the case of the model shown, Hornby control wire was used and the pieces were joined by soldering.

The model-builder who designed the scene shown in Fig. 4 had before him a drawing showing Santa Claus with his team of reindeer drawing a sleigh, and he had thoughts of making a real Christmas model by including that famous figure. This is not a very easy task, but possibly some model-builders may like to try it, and it would be interesting to see the results of the efforts of those who set out to accomplish this feat.

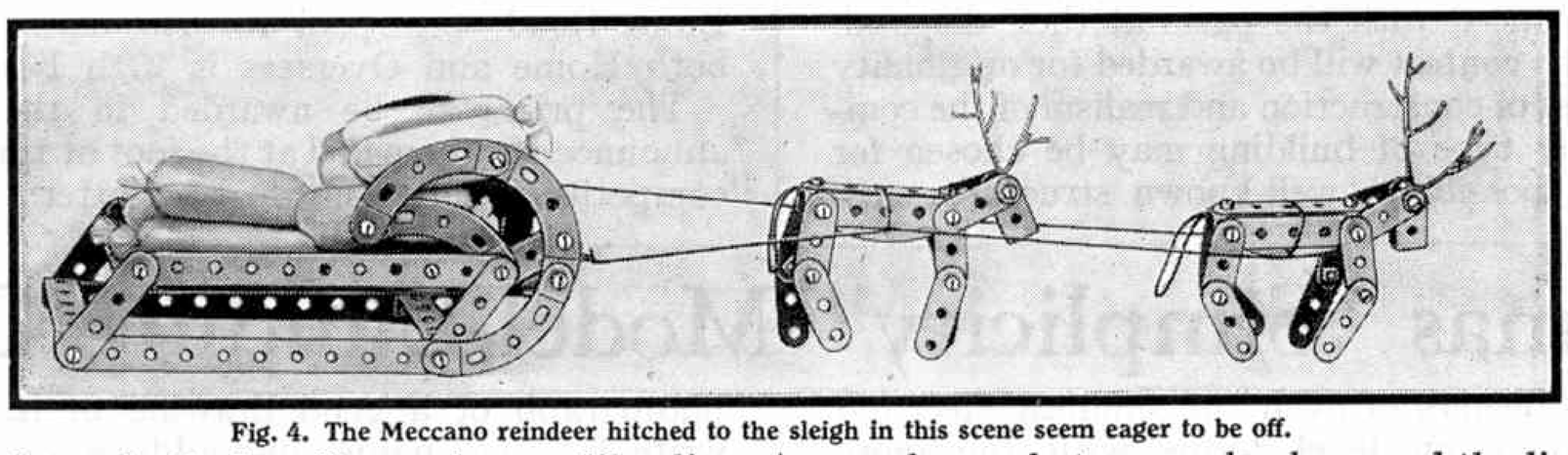


Fig. 4. The Meccano reindeer hitched to the sleigh in this scene seem eager to be off.

The models dealt with so far are outdoor in character, but it should not be overlooked that there are many indoor scenes worthy of reproduction in Meccano. The well-known demonstration model of a dance band points the way to a series of humorous models that give scope for ingenuity. These are not difficult to build. The figures of the conductor, dancers and instrumentalists are easily constructed, chiefly of Curved Strips, and the introduction of a boiler end to act as an abbreviated skirt gives a good effect. The necessary movement is given by mounting the figures on Rods passing through the platform on which they perform, and the Rods are raised and lowered by means of Eccentrics. The antics of dancing figures with hinged arms and legs can then be made very amusing, and the fun is increased when those who see the models try to find out how they work. Some of the figures might be made to strike small bells producing different notes, and there are opportunities for excellent effects in this suggestion.

Many other things that happen at Christmas and New Year parties also form good subjects for Meccano models. A group of people making merry at a well-laden table would be attractive when reproduced in miniature, especially if a touch of caricature were introduced into the make-up of the figures themselves, or into the actions they are made to perform.

Another interesting suggestion is to build models showing lively games in progress. The best type of game of course is one in which some regular movement is maintained. For instance, musical chairs lends itself well to reproduction, for the figures taking part in it can be made to pass slowly round the line of chairs placed in readiness for them, and a trip movement that would cause some of these figures to fall on to the chairs, and others to collide with each other, would give model-builders an opportunity of showing their skill.

It is not necessary that the figures in a model of this kind should seat themselves with the precision that experts at the game show. A much better effect is obtained by presenting a scene of confusion when the movement stops, and by allowing the figures simply to drop on the chairs in a haphazard manner, suggesting frantic efforts to avoid being left out of the game.

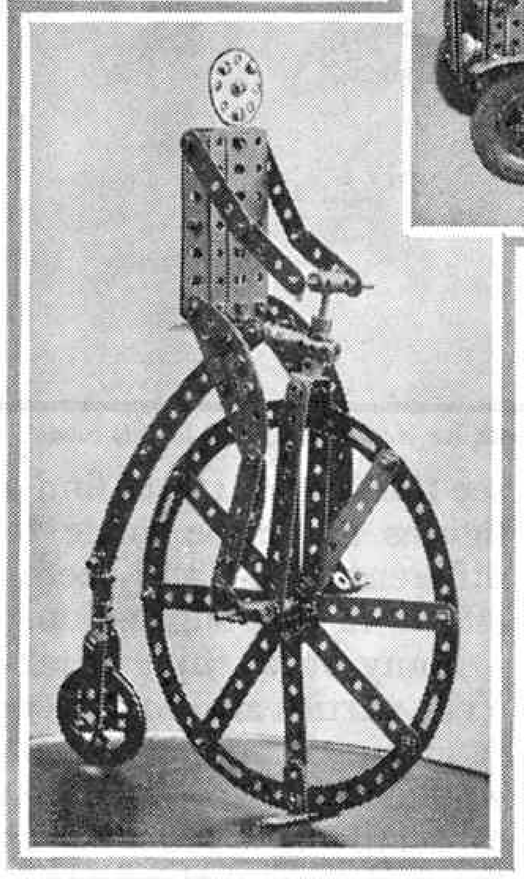
A final suggestion for humorous models of a type that would be appreciated at Christmas is to visit picture houses where good cartoons are being shown. The figures in the cartoons often are suitable for reproduction in Meccano.

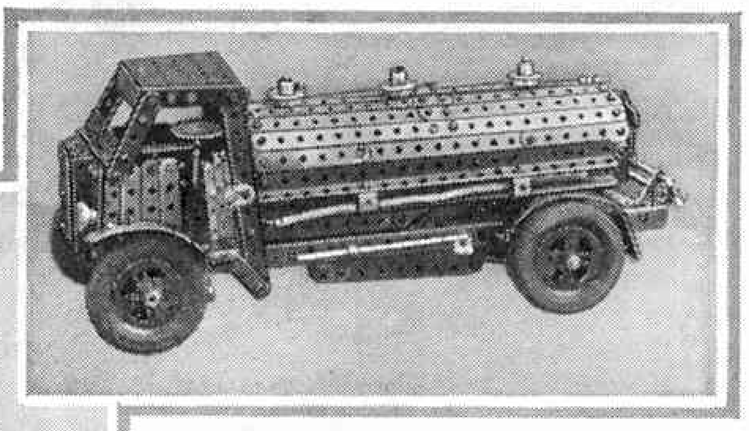
Christmas Holiday Competitions

Prizes for Models of All Kinds

Building a Meccano model is indeed good fun, but the pleasure is greatly enhanced if the model is built with a definite aim in view. That is why we are continually urging model-builders to take part in the competitions announced each month in the "*M.M.*" This month we are organising two competitions, one of which is designed specially for models built from the larger Meccano Outfits, while the other provides a splendid opportunity for those who possess only small Outfits to win prizes.

In the first of these competitions valuable prizes are offered for the best models of buildings of all kinds. The reproduction of houses, castles, churches and similar structures affords an interesting change from the construction of mechanical models, and provided that care is taken to choose suitable Meccano parts, really good work can be done in this direction. Architectural model-building also gives ample scope for originality in choice of subject and for the competitor to exercise his artistic abilities.





Prize-winning models from recent Meccano Competitions. The penny farthing bicycle was built by G. Hudson, Doncaster, and the petrol tank lorry by L. Defries, Streatham, London.

Several fine examples of architectural models have been illustrated in the "*M.M.*" from time to time, and competitors should have no difficulty in finding good subjects that can be reproduced with the parts at their disposal.

The prizes in this contest will be awarded for originality of subject, neatness of construction and realism of the completed model. Any type of building may be chosen for modelling, but if possible a well-known structure, such as a famous castle or church should be selected.

Illustrations of suitable subjects are quite easy to obtain and photographs of many fine buildings that would be excellent for reproduction have been published in the "*Meccano Magazine.*" Any size of Outfit may be used, and models of the more simple architectural subjects will receive just the same consideration as large models. Mere size alone will not ensure success for a model.

After the model is completed it is only necessary to obtain an illustration of it. This may be either a photograph or drawing, but a photograph is best if it is possible to obtain one. This need not be a professional photograph, a small "snap" will do provided that it is clear and sharp in detail. Readers who wish to photograph their models themselves and possess only simple box cameras will find many useful suggestions in the article "How to Photograph Competition Models," which appeared on page 648 of the November 1936 issue of the "*M.M.*"

The competition is open to readers of all ages, living in any part of the world and there will be one section only. Each competitor must state his age, name and full address on the back of his entry and if the model is a large and complicated one a short description of its construction should be prepared. This, together with the photograph or drawing should be enclosed in an envelope addressed Christmas "Architectural" Competition, Meccano Ltd., Binns Road, Liverpool 13. The closing date for entries both Home and Overseas is 27th February, 1937.

The prizes to be awarded in the competition are announced in the panel at the foot of this page. Successful competitors will be notified by letter.

Christmas "Simplicity" Model-Building Contest

In this contest owners of even the smallest Meccano Outfits can compete on level terms with the more fortunate possessors of the more ambitious sets, and we hope that every Meccano boy who reads this announcement will decide to send in an entry. Prizes will be awarded to Meccano model-builders who succeed in constructing the most ingenious and realistic models from the smallest number of parts. Competitors may choose any subject they like for their models and the more unusual and interesting this is the better the chance of winning a prize.

When the model is completed the competitor should obtain either a photograph or a good drawing of it. He should then write his age, name and address on the back of the illustration and send it to "Christmas Simplicity Model-Building Contest," Meccano Ltd., Binns Road, Liverpool 13. The actual model must not be sent.

The competition will be divided into two Sections: A, for readers of all ages living in the British Isles, B for readers of all ages living Overseas. The prizes to be awarded in each Section are listed in the panel at the foot of this page. The closing date for Section A is 31st December, 1936, and in Section B, 27th February, 1937.

Prizes offered in these Competitions

"Architectural" Competition

1st, Meccano or Hornby Products value £5/5/–.
2nd, Meccano or Hornby Products value £3/3/–.
3rd, Meccano or Hornby Products value £2/2/–.

"Simplicity" Competition

The Prizes in each Section are:
1st, Meccano or Hornby Products value £2/2/–.
2nd, Meccano or Hornby Products value £1/1/–.
3rd, Meccano or Hornby Products value 10/6.
There will be also a number of consolation awards in each competition.

Model-Building Competition Results

By "Spanner"

"Merchant Ship" Contest

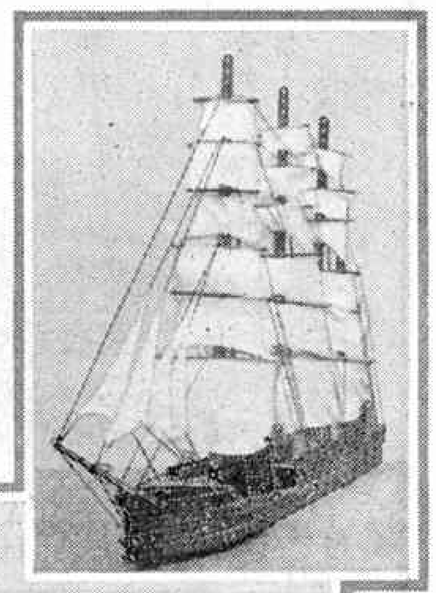
The prizewinners in the "Merchant Ship" Contest, which was announced in the June issue of the "*M.M.*" are as follows:

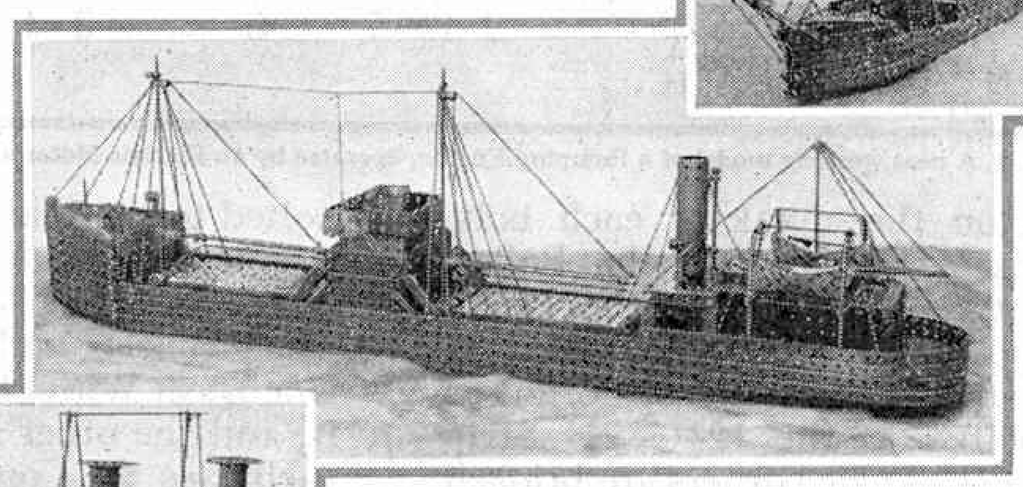
1st Prize, Meccano or Hornby products value £5/5/–: A Bunce, Harpenden. 2nd, products value £3/3/–: J. Willems, Hoboken, Antwerp. 3rd, products value £1/10/–: M. Drynan, Wallington, Surrey.

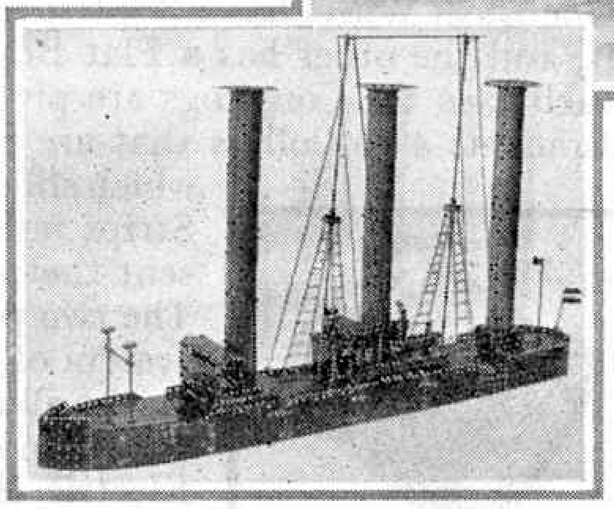
Products value 10/–: J. Nie, Shanghai; C. Turner, Exeter; R. Jones, Rochford, Essex; R. Cooper, Ringmer, Nr. Lewes; P. Cockram and W. Stewart, Shoreham-by-Sea.

Some idea of the great range covered by the entries in this competition is given by the illustrations on this page, which show three of the many different types of vessels that were reproduced by competitors. The judges found great difficulty in deciding the model most worthy of First Prize. The final choice lay between a fine model of the Flettner rotor ship "*Barbara*," which was submitted by A. Bunce, and a splendid reproduction of the steamship "*The City of Hope*" entered by J. Willems. Both models are really interesting and realistic, but after careful consideration the judges decided to award First Prize for the rotor ship. They were influenced in reaching their decision by the fact that this model is the better example of good Meccano construction and also is evidence of its builder's endeavour to find an original subject for his entry. The model sent by Willems is more elaborate in detail, and generally is an excellent piece of work, but showed too much reliance on the use of bent or otherwise mutilated parts for obtaining realistic effects. From this standpoint "*The City of Hope*" is inferior to the model rotor ship. By the exercise of a little ingenuity realism usually can be achieved without altering parts in any way.

For the benefit of those readers who possess back issues of the "*M.M.*," it may be mentioned that the principle of the Flettner rotor ship was dealt with on page 487 of the issue for August 1926. Although this kind of ship has not proved successful commercially, it forms an interesting type for modelling in Meccano and provides constructional problems that call for considerable model-building skill for their satisfactory solution. In Bunce's model each rotor is made from four boilers, bolted together and strengthened by means of a Rod, which passes through their centres. The hull is made entirely from Flat Plates, and the various sections of the superstructure are made from Strips and Angle Girders.







All these models won prizes in the "Merchant Ship" Competition. The sailing ship was built by M. Drynan, Wallington, Surrey, and the oil tanker by R. Cooper, Ringmer. The rotor ship on the left won First Prize for A. Bunce, Harpenden.

The model of "*The City of Hope*" is remarkable for its detail work, but is less interesting than Bunce's model from the average model-builder's point of view because few owners of Meccano Outfits wish to mutilate their parts to the extent adopted in its construction. I congratulate Willems on his patience in reproducing in his model even the smallest details of the prototype. His representations of the davits and life-boats, winches, bollards and derricks are all very good indeed and faithfully reproduce the corresponding features of the vessel.

The entry that won Third Prize is the fine full-rigged sailing ship illustrated on this page, and I was greatly impressed by the realistic effect that its builder, M. Drynan, had managed to obtain. The model is intended only to show the chief characteristics of a vessel of this type, and it is not based on any particular ship. Photographs were submitted showing the model both with bare-rigging and with sails set as in the illustration reproduced here, and in my opinion, this is one of the best efforts at reproducing a ship of this kind that I have seen. There is one direction in which I think some improvement could be made, however. The masts are constructed from Strips, and I think that such parts are too heavy for the purpose. Rods undoubtedly would be more suitable.

The model shown in the centre illustration on this page won one of the smaller prizes and was built by R. Cooper. As a whole the model can scarcely be regarded as original, either in design or subject, but several portions attracted the judges on account of their interesting construction. For example the life-boats are made from $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bent to U shape, the corners being bolted together in pairs to form the bow and stern.

Britain's Blue Riband liner the "*Queen Mary*" was chosen by many boys as the subject for their entries, and one of the best of these is the model sent by J. Nie. It possesses a very stout hull built up from Strips. The upper decks are made from Flat Girders. This system of construction provides an interesting change from the usual method, in which Flat Plates are used, and was adopted by several other competitors. Unfortunately the stern of the vessel is not quite correct in outline and might have been more faithfully reproduced if larger radius Curved Strips had been used. The funnels are represented by Boilers covered with coloured paper, the forward funnel being fitted with two bolts to represent sirens. The rigging and the wireless aerials are a little too thick in comparison with the masts.

Another good model of the "*Queen Mary*" was constructed by P. Cockram and W. Stewart jointly. In this model a great amount of trouble has been taken to reproduce the deck fittings of the vessel correctly. The forward ends of the upper decks are stepped back as in the actual vessel, and a neatly built workable anchor winch is fitted in the bows. The masts are built up with Rods, and unfortunately they appear rather thin in comparison with the general dimensions of the ship. The funnels are fully stayed, and the forward funnel has two Cranks to represent sirens. The ventilators are made from Couplings mounted on a Rod, with a Flanged Wheel for the cowl; I think a more realistic appearance would have been obtained by making them in box-form with Double Brackets. This system of construction would follow more closely the method adopted on the actual ship. The bridge is neatly constructed with Strips and Plates and the forward ends of the main decks beneath it are neatly moulded to reproduce the bow-shape construction adopted in the actual vessel.

Lifting Bridge "Errors" Competition

In this contest, which was announced in the issue of the "*M.M.*" for July 1936, readers were asked to make lists of all the errors they could discover in a small model of a vertical lifting bridge, an illustration of which accompanied the announcement. The most complete lists were submitted by the following competitors, and they have been awarded prizes as indicated.

Section A (for competitors living in the British Isles)

1st Prize, Meccano or Hornby products value £2/2/–: L. Willis, London, S.E.13. The 2nd and 3rd Prizes have been combined and divided equally between Miss L. J. Slater, Portsmouth, and W. Raybould, Jun., Bloxwich, each receiving goods value 15/9.

Products value 5/–: F. Phillips, Chadwell Heath; G. Askew, Horsham; N. Ferry, Timperley; F. Grace, Whitchurch; A. Thomas, Mollington.

Section B (for competitors living Overseas)

1st Prize, Meccano or Hornby products value £2/2/–: J. Rodriguez, Montreal. 2nd, products value £1/1/–: B. Wood, Berea, Johannesburg. 3rd, Products value 10/6: J. Capelli, Buenos Aires.

Products value 5/–: Nyi Kyih Vung, Shanghai; G. Milling, Lindsay, Ontario; J. Nie Shanghai; J. Smith, Melbourne; T. Ellis, Bombay.

New Outfit Models

A Greek Galley and a Target

PUMPING ENGINE models have often been described and illustrated in the "*M.M.*," but the engine shown in Fig. 1 justifies the appearance of yet another model of this kind. Although this is a simple one, built with Outfit G, it is one of the neatest that have ever been designed.

In building the model, construction should be commenced with the base as shown in Fig. 1. The cylinder, which is represented by a Boiler, is next secured in position. This is done by bolting a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate on opposite sides of the Boiler, and joining these to the two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates which are fastened to the Flexible Plates 9, by means of Angle Brackets. A washer should be placed on the shank of each bolt, between the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and the Boiler, in order to leave sufficient room to enable the Boiler Ends to be pushed into position.

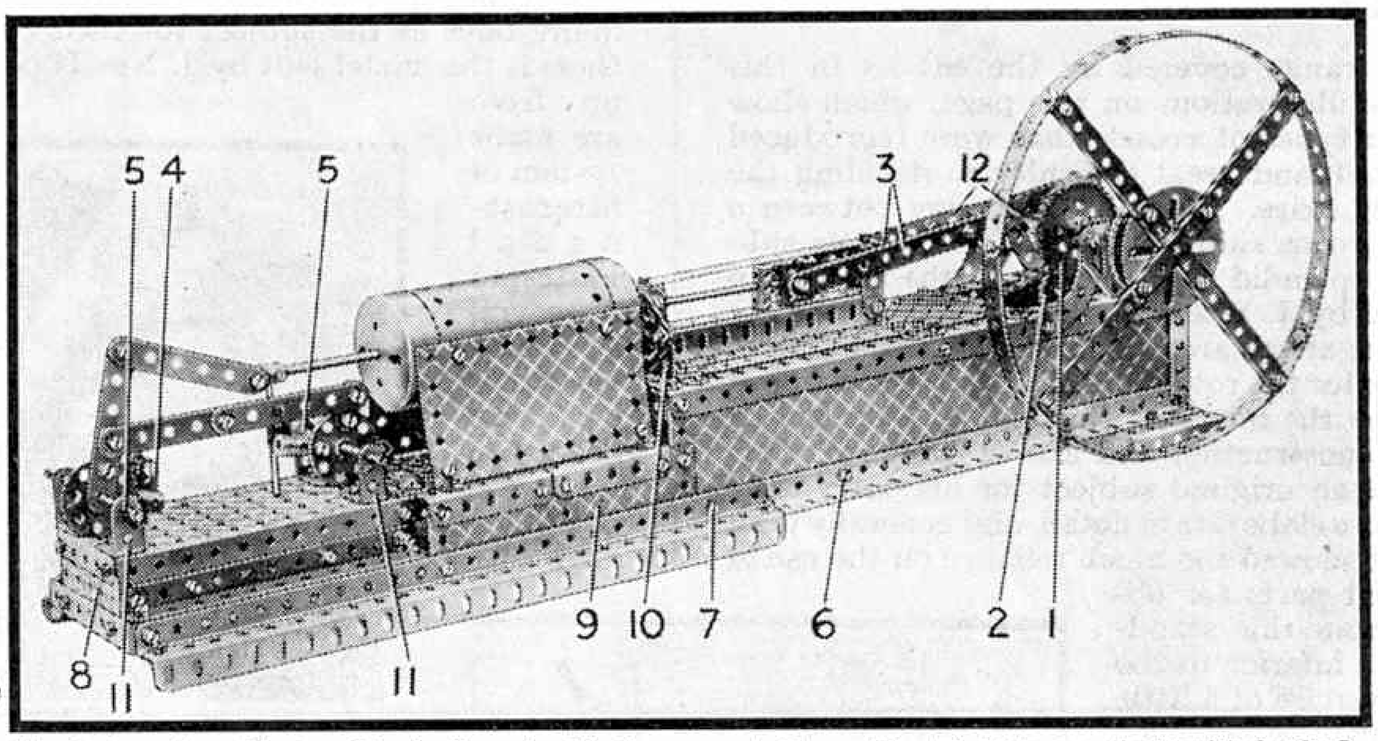


Fig. 1. A neat working model of a Pumping Engine, operated by an Electric Motor and built with Outfit G.

Two $12\frac{1}{2}''$ Angle Girders and two pairs of $2\frac{1}{2}''$ Cranked Curved Strips are now bolted to the $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates of the base, and the $12\frac{1}{2}''$ Angle Girders are bridged by five $3\frac{1}{2}''$ Strips located as shown. The $3\frac{1}{2}''$ Strips support a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate, and the latter forms the base for the crosshead slides. These are made by bolting two $5\frac{1}{2}''$ Angle Girders together in the form of a channel girder, and then bolting two further $5\frac{1}{2}''$ Angle Girders to this, so that a girder with a cross-section like a Double Bent Strip is formed. Two Trunnions are bolted to one end of the Girder, and two $1\frac{1}{2}''$ Strips to the other, and the two sets are connected across their free ends by Double Brackets. The Double Brackets are spanned by a $5\frac{1}{2}''$ Strip, and the tops of the Trunnions are supported by means of $1'' \times 1''$ Angle Brackets 10. The pairs of $2\frac{1}{2}''$ Cranked Curved Strips previously mentioned each have a Flat Trunnion and a Double Bent Strip bolted to them. The Double Bent Strip should be on the inner side.

Construction of the mechanism is now commenced. A 2" Rod forms one part of the crankshaft, and this has a Crank secured on one end. A $3\frac{1}{2}''$ Rod is used for the part of the crankshaft that supports the large flywheel, and also carries a 2" Pulley 1, a Worm, a 2" Sprocket and a Crank. The Crank is coupled to the first Crank by a $\frac{3}{4}''$ Bolt, which is held firmly in position by means of nuts. On the Bolt are two $4\frac{1}{2}''$ Strips 12, spaced by four washers, and bent slightly as shown in the illustration so that they pass on either side of the crosshead slides. The Strips 12 are extended by $5\frac{1}{2}''$ Strips 3, overlapped four holes, and the free ends of these are secured to the centre tapped holes of a Coupling by $\frac{3}{8}''$ Bolts, on which are Collars. An $11\frac{1}{2}''$ Rod is used for the Piston Rod, and this passes through the centre holes of the Boiler Ends, and is secured in the Coupling. Further Couplings are placed on the Rod as indicated.

Pairs of $1'' \times 1''$ Angle Brackets 11 are bolted to the Flanged Plate, which is held in place at the rear of the cylinder by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 8 and $5\frac{1}{2}''$ Strips, and these form bearings for $3\frac{1}{2}''$ Rods 5 that support Bush Wheels and are held in position by Spring Clips. One Bush Wheel has a 3" Strip and a Coupling secured to it, and the other has a Flat Bracket and a Coupling. In each case the Couplings are pivotally connected by Flat Brackets 4 to Collars that are carried on vertical Rods, which slide in $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips inside the model and represent the piston rods of the pumps. The two pumps are connected by a system of pivoted Strips, as shown in the illustration.

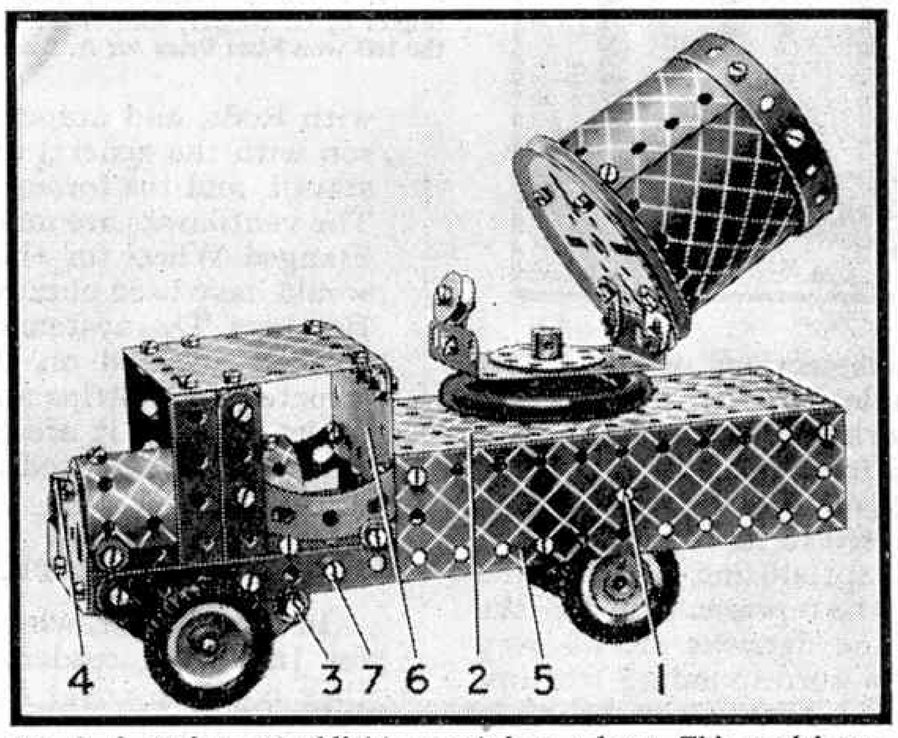


Fig. 2. A modern searchlight mounted on a lorry. This model can be built with Outfit C.

The model is driven by an E6 Electric Motor, which is mounted inside the model on $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips held in place by Bolts 6 and 7. The only reduction gearing, fitted between the Motor side plates, consists of two stages, each of ratio 3 : 1 and using a 57-teeth Gear and a $\frac{1}{2}''$ Pinion. The final shaft of the reduction gear carries a $\frac{3}{4}''$ Sprocket Wheel, which is connected by Chain to a 1" Sprocket 2 carried on a Rod that is journalled in the frame of the model. A second 1" Sprocket on the same shaft drives the 2" Sprocket 1.

Parts required to build the model Pumping Engine: 16 of No. 2; 2 of No. 2a; 5 of No. 3; 3 of No. 4; 2 of No. 5; 2 of No. 6a; 7 of No. 8; 4 of No. 9; 7 of No. 10; 2 of No. 11; 12 of No. 12; 6 of No. 12a; 1 of No. 13; 1 of No. 15b; 5 of No. 16; 3 of No. 17; 1 of No. 20a; 2 of No. 24; 1 of No. 26; 2 of No. 27a; 1 of No. 32; 4 of No. 35; 156 of No. 37; 3 of No. 37a; 22 of No. 38; 2 of No. 45; 2 of No. 48a; 4 of No. 48b; 1 of No. 51; 2 of No. 52; 3 of No. 53; 8 of No. 59; 2 of No. 62; 6 of No. 63; 4 of No. 90a; 20" of No. 94; 1 of No. 95; 2 of No. 96; 1 of No. 96a; 1 of No. 109; 1 of No. 111; 3 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 of No. 162; 2 of No. 189; 2 of No. 191; 1 of No. 193; 1 of No. 195; 2 of No. 197; 1 E6 Electric Motor.

The model shown in the second illustration is built with Outfit C, and represents a lorry carrying a huge searchlight, forming a mobile unit for such purposes as detecting aircraft at night. In building it two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates 5, are first bolted to the side flanges of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 2, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 6 is secured in place as shown. One of the bolts holding each of the large Flexible Plates 5 in position carries also a $2\frac{1}{2}''$ Cranked Curved Strip. A $5\frac{1}{2}''$ Strip is bolted to the lower edge of 5, and at the front of the model a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip connects these together.

While the $2\frac{1}{2}''$ Double Angle Strip is being placed in position, Cranked Curved Strips that represent the front springs are fixed in place. The free ends of these are clamped firmly by the washers on Bolts 3. A "U" Section Curved Plate (Part No. 199) is held in place by a Double Angle Strip, and on the near side of the lorry this is clamped to a $3\frac{1}{2}''$ Strip by washers. The space on the offside of the bonnet is filled in by two Trunnions 4.

The front axle is a $3\frac{1}{2}''$ Rod journalled in the centre holes of the Cranked Curved Strips that form the front springs; and the rear one is a 2" Rod journalled in a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that is bolted to a $\frac{1}{2}''$ Reversed Angle Bracket. This in turn is fixed to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip fastened in place by bolts 1. The "searchlight" is made by bending two $5\frac{1}{2}''$ Strips into a circle, and bolting two $2\frac{1}{2}''$ Flexible Plates and a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate to them. The whole assembly is fastened to a 3" Pulley by means of four Angle Brackets.

Parts required to build the model Lorry and Searchlight: 2 of No. 2; 1 of No. 3; 2 of No. 5; 3 of No. 10; 8 of No. 12; 2 of No. 12c; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 1 of No. 19b; 4 of No. 22; 1 of No. 23; 1 of No. 24; 62 of No. 37; 2 of No. 37a; 5 of No. 38, 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 4 of No. 90a; 1 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 187; 1 of No. 188; 2 of No. 189; 3 of No. 190; 1 of No. 191; 1 of No. 199; Four 1" Tyres not included in Outfit.

The C Outfit model shown in Fig. 3 represents a Greek Galley. Its construction is simple and should be commenced by bolting together a $12\frac{1}{2}''$ and a $5\frac{1}{2}''$ Strip with an overlap of three holes. At their free ends the $12\frac{1}{2}''$ Strips are connected by a Double Bracket, and the bolts holding the Double Bracket in place are used to secure $2\frac{1}{2}''$ Curved Strips in position. The $5\frac{1}{2}''$ Strips form the bows of the galley. They are bent slightly and bolted together through their fourth holes. A $12\frac{1}{2}''$ Strip is now attached to the second hole of each of the $2\frac{1}{2}''$ Curved Strips that form the stern, and these are connected to the lower $12\frac{1}{2}''$ Strips at their centre points by Flat Brackets, and at their free ends by $2\frac{1}{2}''$ Cranked Curved Strips 2 and also by Flat Brackets.

At the stern, two $5\frac{1}{2}''$ Strips are bolted to the Curved Strips on each side, and the upper ends of the Curved Strips are joined by a Double Bracket. A $2\frac{1}{2}''$ Strip is next curved slightly, and after being pushed beneath the upper Double Bracket is bolted to the lower one.

The gunwales of the galley are secured in place to the upper $12\frac{1}{2}''$ Strip by Angle Brackets. The deck work is now commenced. The deck amidships consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates, two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and a Flat Trunnion at the stern end. Four $\frac{1}{2}''$ Obtuse Angle Brackets are used to fill in the pointed portion in the stern.

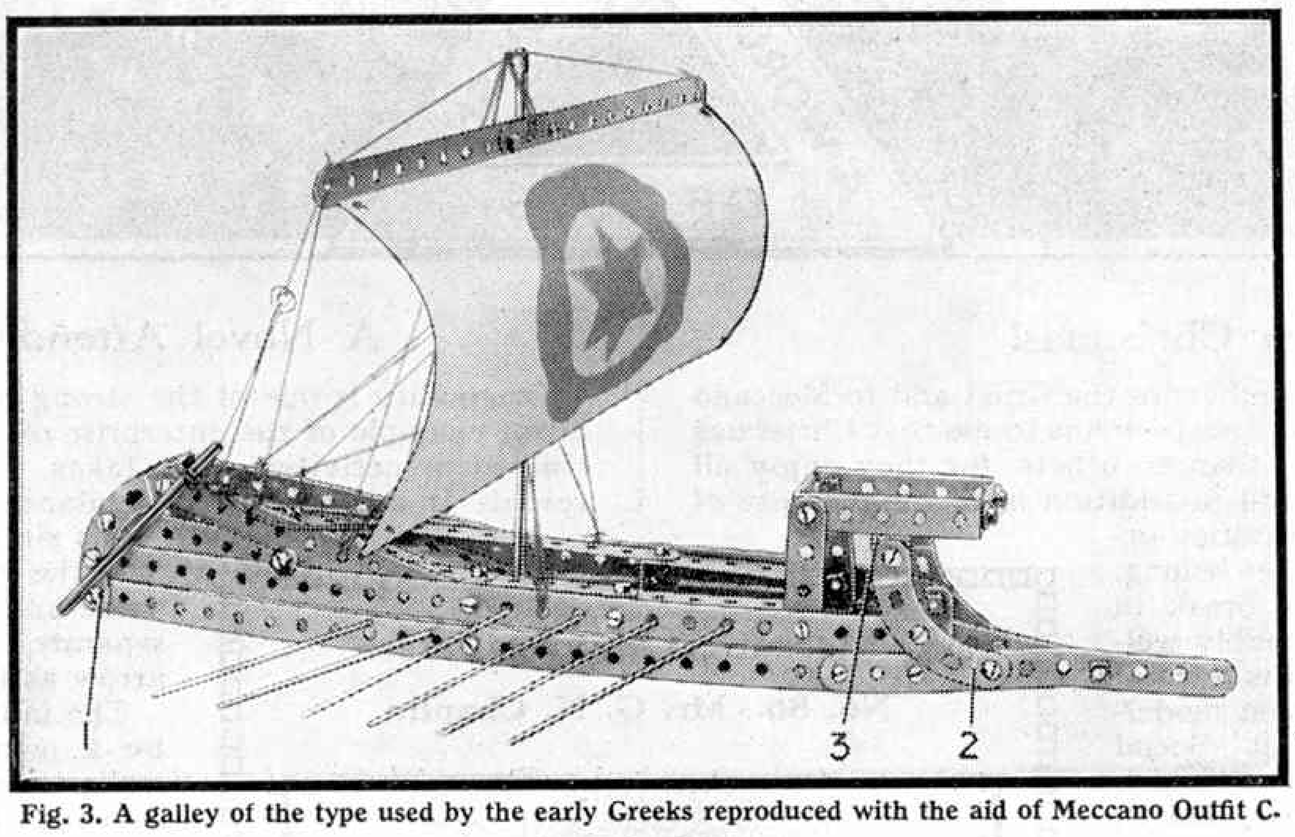


Fig. 3. A galley of the type used by the early Greeks reproduced with the aid of Meccano Outfit C.

The raised portion of the bows is now constructed, and is joined to the hull by two $2\frac{1}{2}''$ Strips, and to the projecting $2\frac{1}{2}''$ Curved Strips 2 by Angle Brackets 3.

The mast is composed of a 5" Rod, which is secured to the deck by a Bush Wheel and has a 1" fast Pulley secured by its setscrew as near to its upper end as possible. This leaves sufficient room to place a second 5" Rod in the boss of the Wheel, and the whole is held rigid by cord-bracing. The method of fitting the sails, rigging and oars will be clear from the illustration.

Parts required to build the Greek Galley: 4 of No. 1; 8 of No. 2; 9 of No. 5; 4 of No. 10; 2 of No. 11; 5 of No. 12; 4 of No. 12c; 2 of No. 15b; 1 of No. 16; 1 of No. 22; 1 of No. 24; 58 of No. 37; 8 of No. 38; 1 of No. 40; 5 of No. 48a; 1 of No. 51; 4 of No. 90a; 1 of No. 126a; 1 of No. 176; 2 of No. 188; 2 of No. 190.

Fig. 4 shows a shooting target built with Outfit C, and consists essentially of a large sheet of plywood that is held upright by a frame of Strips as shown. The rotor that supports the four cardboard "ducks" is mounted on a 5" Rod 5 that is journalled at one end in the frame and at the other end in a Double Bent Strip bolted to the baseboard. The Double Bent Strip should be about half an inch lower than the bearing in the frame so that the Rod 5 is slightly inclined. The "ducks" are bolted to $2\frac{1}{2}''$ Strips 3, each of which has two $\frac{1}{2}''$ Angle Brackets 2 bolted in its second hole, and the pairs of Angle Brackets are pivotally attached to Double Brackets bolted on the arms of the rotor. Angle Brackets 6 bolted to the Strips 3 keep the ducks upright when they are in the firing position, but do not prevent them from falling over when they are hit. It will be found that the ducks will fall over automatically when they reach the position occupied by that at 7, but they will be returned to an upright position when they reach the position shown in the front view of the model.

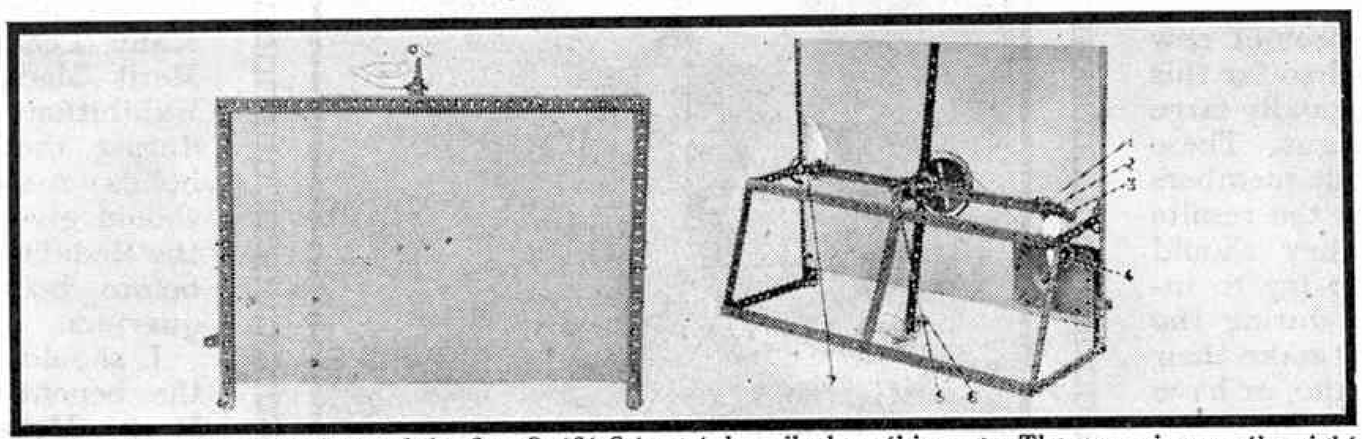
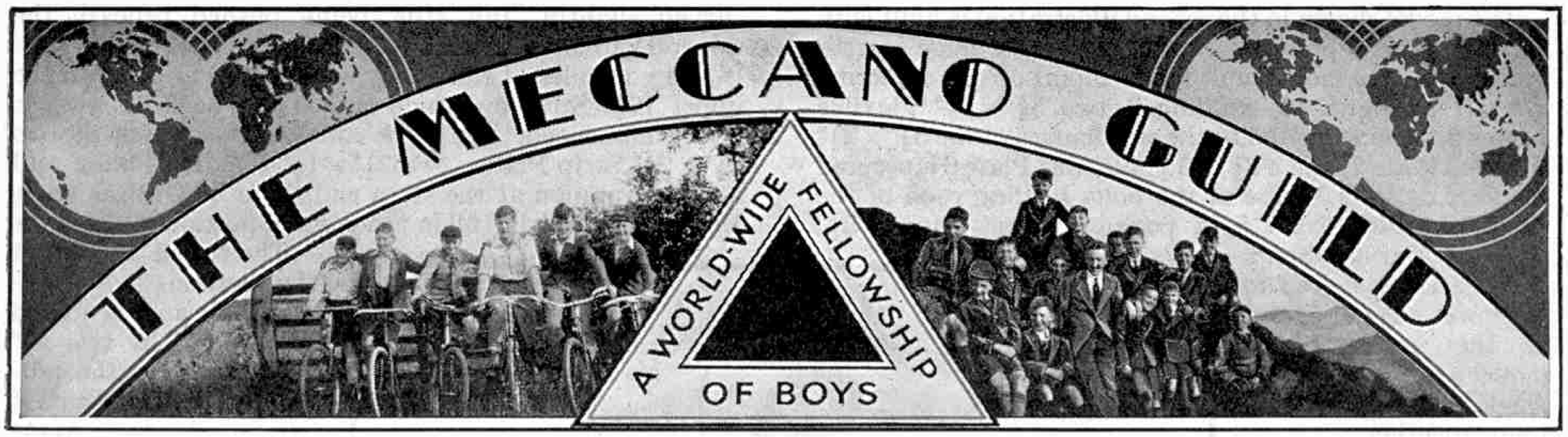


Fig. 4. Front and rear views of the fine Outfit C target described on this page. The rear view on the right shows the construction of the mechanism.

A No. 1 Clockwork Motor is used to drive the model and is bolted to the plywood so that the key shaft is left projecting to enable the Motor to be wound. A Rubber Driving Band, bearing directly on its driving spindle is prevented from slipping off by a 1" fast Pulley 4, and drives a 3" Pulley on the rotor spindle.

Parts required to build the Shooting Target: 6 of No. 1; 8 of No. 2; 2 of No. 3; 8 of No. 5; 4 of No. 8; 4 of No. 11; 12 of No. 12; 2 of No. 12a; 1 of No. 15; 1 of No. 19b; 2 of No. 22; 1 of No. 24; 78 of No. 37; 11 of No. 37a; 11 of No. 38; 1 of No. 45; 2 of No. 48a; 5 of No. 111c; 2 of No. 126a; 1 of No. 186; No. 1 Clockwork Motor.



A Merry Christmas!

A Merry Christmas to all members of the Guild and to Meccano clubs throughout the world. It always seems to me that Christmas means more to Meccano boys than to others, for they enjoy all the usual fun of this season, and in addition have the pleasure of taking part in Christmas festivities organised by the clubs to which they belong.

The Christmas season is a break in ordinary club affairs that is doubly welcome. On the one hand it marks the end of the first winter session's keen model-building. It brings with it Social Evenings and Exhibitions to which parents and friends are invited, and at which everybody present, whether a member or a visitor, has a really happy time and learns to appreciate the advantages of belonging to a live organisation. On the other hand, it is also a preliminary to even better times in store. Enthusiasm is greatly increased as a result of Christmas festivities, especially if the passing of this season has resulted in an addition to the resources of members. New members also come in at this time of the year, and new and lasting friendships are formed that add to the general enjoyment of club life. All this can be turned to good advantage, and Christmas not only can be a merry time in itself, but it also can be made to add to the enjoyment of club life in general.

Welcoming New Members

Most clubs keep the prospect of new members well to the fore, and so far this session there has been an unusually large number of recruiting campaigns. These have been very successful, but members should not rest satisfied with the results achieved so far. Instead they should continue with greater zest to try to interest boys in club life, for during the Christmas month many boys make their first acquaintance with Meccano, or have their interest in model-building increased by the addition of new parts or Accessory Outfits to their stock. Every club member should keep a keen look out for possible recruits of this kind. He will find them among his friends, or at school, and he should do his best to persuade them to join. The most satisfactory plan is to invite them to a meeting, at which they can be introduced to the Leader and other officials, and can see for themselves what good times Meccano boys have.

A point of great importance in developing a really good club spirit is that it is not enough merely to introduce a recruit. The member who persuades a boy to join his club should continue to keep an eye on him in order to see to it that he becomes thoroughly at home and is made familiar with every branch of club activity. Fussiness of course should be avoided, but a display of real friendliness should go far towards turning a recruit into a really valuable member, who will be keenly interested in the welfare of the club as a whole as well as in his own pleasures and hobbies.

Meccano Club Leaders

No. 86. Mr. G. N. Chaplin

Mr. G. N. Chaplin is Leader of the Regent Street Central School (Heywood) M.C. This club was affiliated in April, 1930, and is now one of the largest in the Meccano Guild. Model-building is actively carried on, and Lantern Lectures are a special feature of the club programme.

A Novel Attendance Indicator

Originality is one of the strong points of the Exeter M.C. The latest example of the enterprise of this club is in connection with club-room activities, and takes the form of an indicator that reveals at a glance the attendance at the last meeting, and the totals since the beginning of the month and the beginning of the year. These three items of information are given on separate dials, each having a short arrow acting as a finger.

The indicator was designed and made by a member of the club and its installation created a sensation. A graph showing how the attendance figures compare with those of a year ago also is posted up for members to see, and this practical record, which is always before their eyes at meetings, has stimulated their enthusiasm to such an extent that attendance records are being made almost every week.

Special Merit Medallions

I hope that nominations for Special Merit Medallions earned during the first Winter session will be forwarded to me as soon as possible, to enable me to publish in an early issue of the "*M.M.*" my usual list of awards made during the past year. Nominations must be made by the Leader of the club, and the awards should be made to the members who have done most during the session to advance the interests of the club. Many Leaders like to present Special Merit Medallions and other prizes at Exhibitions or social meetings held during the Christmas and New Year holiday season. Those who wish to do so should give me notice in good time, for the Medallions must be suitably engraved before being despatched from Headquarters.

I should like to mention again, for the benefit of new Leaders, that two Merit Medallions are allotted every session to each club, and that there are no restrictions in regard to the nature of the services for which awards may be made. Those who earn a Merit Medallion value it highly because it comes from the Headquarters of the Guild and is awarded with the knowledge and approval of Mr. Roland G. Hornby, President.

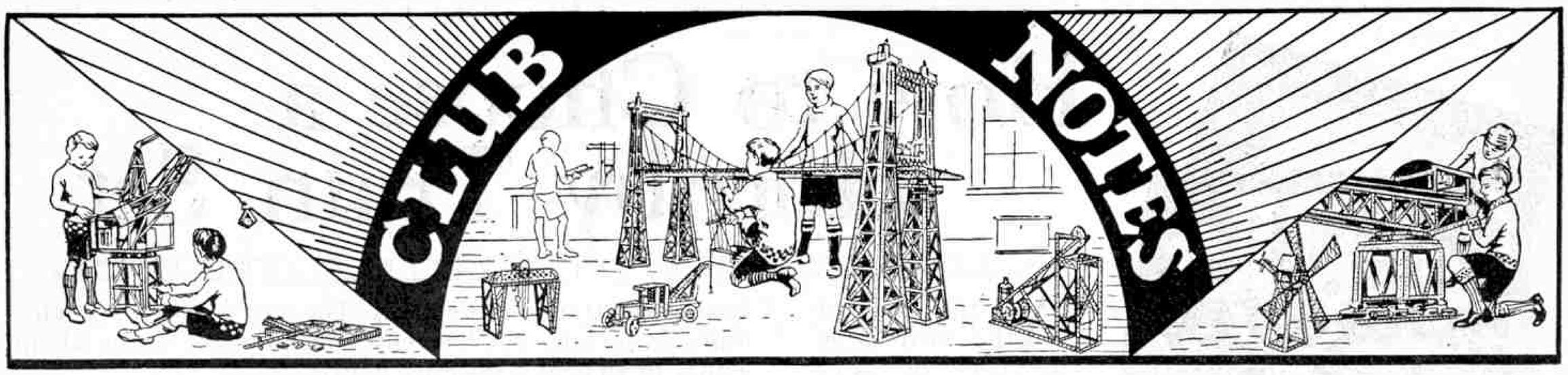
Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

HYTHE—J. E. N. Chappell, Millfield House, London Road, Hythe, Kent.

INVERLOCHY—G. Irvine, 11, Battlefield Crescent, Inverlochy Village, Fort-William.

WESTCLIFF-ON-SEA—H. G. Collard, 122, Hildaville Drive, Westcliff-on-Sea.



Plymouth M.C.—The club celebrates its 10th birthday shortly, and the programme for the event includes a concert, club outing, party and lantern shows, in addition to an Exhibition of record size. The Meccano section are constructing a dockside scene as their chief display, and a smaller dock scene incorporating Dinky Toys is another attraction. Mr. J. S. Stephens, a local gentleman who is very interested in club activities, has consented to be a Vice-President of the club. Club roll: 63. *Secretary:* R. G. Symons, 47, Lisson Grove, Mutley, Plymouth.

St. Giles' Cathedral (Edinburgh) M.C.—The club is now firmly established in its new quarters, and members are delighted with the improved facilities. The club-rooms are open on four afternoons and six evenings a week. The afternoon sessions are for members who live a considerable distance out of the city, and enable them to use the club-rooms immediately after school. An intensive recruiting campaign is proving very successful, and it is anticipated that the desired membership of 300 will be attained before the close of this session. Club roll: 100. *Secretary:* H. W. Govan, 18, Ravelston Park, Edinburgh, 4.

Old Charlton M.C.—An enjoyable visit has been paid to the works of Hovis, the well-known flour millers. A Debate on the topical subject "*Are Speed Records Beneficial?*" ended in favour of such records. Club roll: 21. *Secretary:* W. R. Bailey, 62, Rectory Grove, Woolwich, S.E.18.

Todmorden Road Central School (Burnley) M.C.—A very interesting Lantern Lecture on "*The Lake of Geneva*" has been given by Miss Davenport. Model-building has been the chief activity recently, and at one meeting a competition was held, in which each member had to construct an original model from a certain number of Meccano parts. The contest was won by a new member, who built an excellent model of an Ice Yacht. A lecture on "'*Q*' *Boats*" was much enjoyed. Club roll: 30. *Secretary:* L. Hinton, 4, Thirlmere Avenue, Burnley.

St. Stephen's (Saltash) M.C.—Several model-building meetings have been devoted to constructing models of Carts, and this unusual subject has produced some excellent results. Good models of a Bristol "Bulldog" and a D.H. "Leopard Moth" have also been built. An interest is being shown in model shipbuilding, but not much has yet been done in this direction. Games provide an occasional and popular variation in the club programme. Club roll: 10. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Claremont Avenue (Kenton) M.C.—Two "Simplicity" model-building contests have been held. The winning model in the first contest was a clever model of a microphone, and in the second an electric fan. Games have been played on several occasions. Club roll: 16. *Secretary:* G. Turton, 5, Brookfield Crescent, Kenton, Harrow.

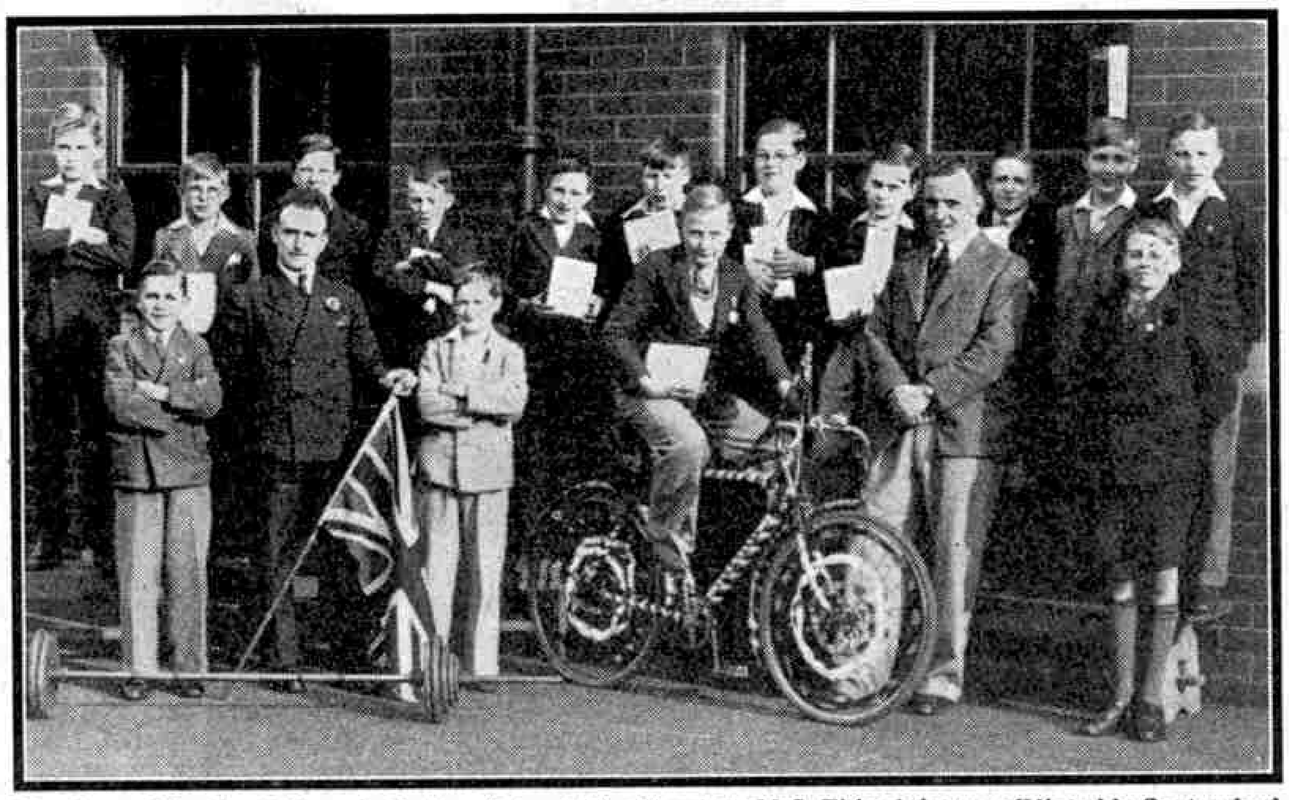
Barnard Castle School M.C.—Preparations are in hand for an Exhibition. There is a considerable demand for a Wireless section, and the formation of this is being considered. It is hoped to play a series of football matches during the winter. Club roll: 15. *Secretary:* S. W. Telfer, The School, Barnard Castle, Co. Durham.

Exeter M.C.—The club-room has been painted and re-decorated, and the equipment re-arranged so as to provide more room for the members. Very great interest is being taken in model shipbuilding, and wooden models of 81 naval vessels have been built. The Monday evening serial reading, by the Leader, of one of the well-known "William" books has provided much amusement. It has been suggested that this should be followed by the story of the club, which was formed in 1917. Attendance at meetings has been well maintained, and shows a higher average than last year. Model-building activities have continued unabated, and models completed have included locomotives, aeroplanes, ships, motor vehicles and cranes. Club roll: 31. *Secretary:* E. Ashwood, 188, Pinhoe Road, Exeter.

Fraserburgh M.C.—The Exhibition has been postponed for a few weeks. It will include Meccano models, a Hornby layout, and a section devoted to model aeroplanes. The event is being well advertised, and a large attendance is expected. Club roll: 29. *Secretary:* W. J. Dawson, Phingask, Fraserburgh.

Sid Vale M.C.—Some very enjoyable rambles have taken place, and have included visits to the top of Peak Hill and tramps across the moors. On one occasion thick mist descended while the party were on the high moorland, but they managed to keep together and returned safely. Club roll: 20. *Secretary:* L. R. J. Gliddon, Sheffield House, Sidmouth.

Wednesbury M.C.—Recent outings have included a visit to the local pumping station of the South Staffordshire Water Works Company, where the party were greatly interested to see the powerful pump at work. During a visit to the new Central Fire Station at Birmingham members were allowed to inspect the many modern types of fire fighting apparatus there, and witnessed a demonstration of the latest type of city fire alarm. The Patent Shaft and Axletree works at Wednesbury also have been visited. There members watched the rolling of iron bars, looked through blue glasses into the furnaces, and saw one of the smaller furnaces being tapped. Occasionally Games Evenings are held, and are always very popular. An intensive recruiting campaign is to be carried out. Club roll: 20. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.



Members of the South Parade Modern School (Cleckheaton) M.C. This club was affiliated in September 1934. In addition to excellent model-building programmes, successful Exhibitions have been held. Our photograph shows members' preparations for a Carnival. Photograph by J. Hardill, Cleckheaton.

AUSTRALIA

Maylands M.C.—The Exhibition attracted over 200 visitors. The chief feature of the display was a large-scale Meccano Harbour, laid out in the form of the letter "U." The sea was realistically represented by cellophane, and cotton wool made effective spray. The models displayed in the harbour included a miniature of H.M.S. "*Revenge*" and two battle cruisers, and on the quayside were a high speed coaler and various types of cranes. There was also a dock railway. A recent Lecture dealt with "*The History of the Aeroplane.*" The club-room is to be extended so that the many boys waiting to join the club can be accommodated. Club roll: 32. *Secretary:* M. Thomson, 13, Kennedy Street, Maylands, West Australia.

Melbourne M.C.—A Reading Night has been held, several members bringing engineering books and reading interesting extracts. The leader also brought along a large selection of railway literature for the use of members. Meetings have been devoted chiefly to model railway operations, and on one occasion a talk explaining the operation of a semaphore signal worked by a solenoid was listened to with keen interest, as this type of signal is used on the club layout. A Meccano model of a mail bag catcher built by one member attracted much attention. Club roll: 10. *Secretary:* L. Ison, 8, Hayes Street, Northcote, Victoria, N.16.

CANADA

Montreal Y.M.C.A. M.C.—Many interesting models have been built, and members are rapidly becoming more skilful in adapting their Meccano parts to different uses. The Leader constructed an excellent Meccano Motor Chassis and demonstrated it to members. Visits have been paid to local factories, and an enjoyable trip was made to Mount Royal, where a picnic was held. Club roll: 9. *Leader:* Mr. J. Rodriguez, 1900, Tupper Street, Apt. 4, Montreal, P.Q.

Peterborough (Ontario) M.C.—This club is now divided into two groups, a junior one called "Eccentrics," and a senior one known as "Gears." Meetings have been held regularly, and model-building activities have been supplemented by talks on Meccano construction. Tobogganning and other activities have given variety to the programme. Club roll: 10. *Leader:* R. Borland, 744, George Street, Peterborough.

Rosemount M.C.—This club has resumed activities under the leadership of Mr. Ernest Rawlings, and an attractive model-building programme is being planned. Club roll: 17. *Secretary:* L. H. Tompkins, 5706, 4th Avenue, Rosemount, Quebec.

INDIA

Ranjit (Lahore) M.C.—During the summer most club activities have been out-of-doors. One group of members has visited the hydro-electric power station at Jaginder Nagar. Model-building, stamp collecting and fretwork are the chief activities of the club, and preparations are in hand for an Exhibition. Club roll: 20. *Secretary:* S. Harbhajan, 689, Krishna Bazar, Gowalmandi, Lahore.

Rawalpindi M.C.—This recently-affiliated club is making good progress. An excellent club-room, fitted with electric light, has been obtained, and meetings are held fortnightly. Model-building and fretwork are the chief hobbies, and the President has given talks on these subjects. An active interest is also taken in photography and stamp collecting. All the members are very enthusiastic, and a steady increase in membership is anticipated. Club roll: 10. *Leader:* Mr. Ismail H. Lotia, Bakery Road, Rawalpindi.

NEW ZEALAND

Christchurch M.C.—Model-building and Hornby Train operations have been the chief features of indoor meetings. On one occasion each member was given a box of Meccano parts and asked to build the best model he could with them in the short time available. Some excellent and surprisingly varied models were produced, and included various types of cranes and guns, a motor truck, Roman chariot, and a Chinese rickshaw. The first, second and third prizes in the Meccano competition organised by the Canterbury Winter Show authorities were won by the members of the club. During school holidays a visit was paid to the Addington Railway Workshops, and Cycle Runs have also been enjoyed. Club roll: 23. *Secretary:* L. W. Best, 28, Circuit Street, Strowan, Christchurch.

SOUTH AFRICA

Malvern M.C.—A special Exhibition in aid of charity resulted in a profit of nearly £65. It was opened by Mr. T. A. M. Huddle, a member of the Johannesburg City Council. The Exhibition Hall was decorated in Eastern style by one of the members, and every stall had a background showing some Eastern scene. Club roll: 85. *Secretary:* B. Saunders, P.O. Box 8, Cleveland, Johannesburg.

Unaffiliated Club

AUSTRALIA

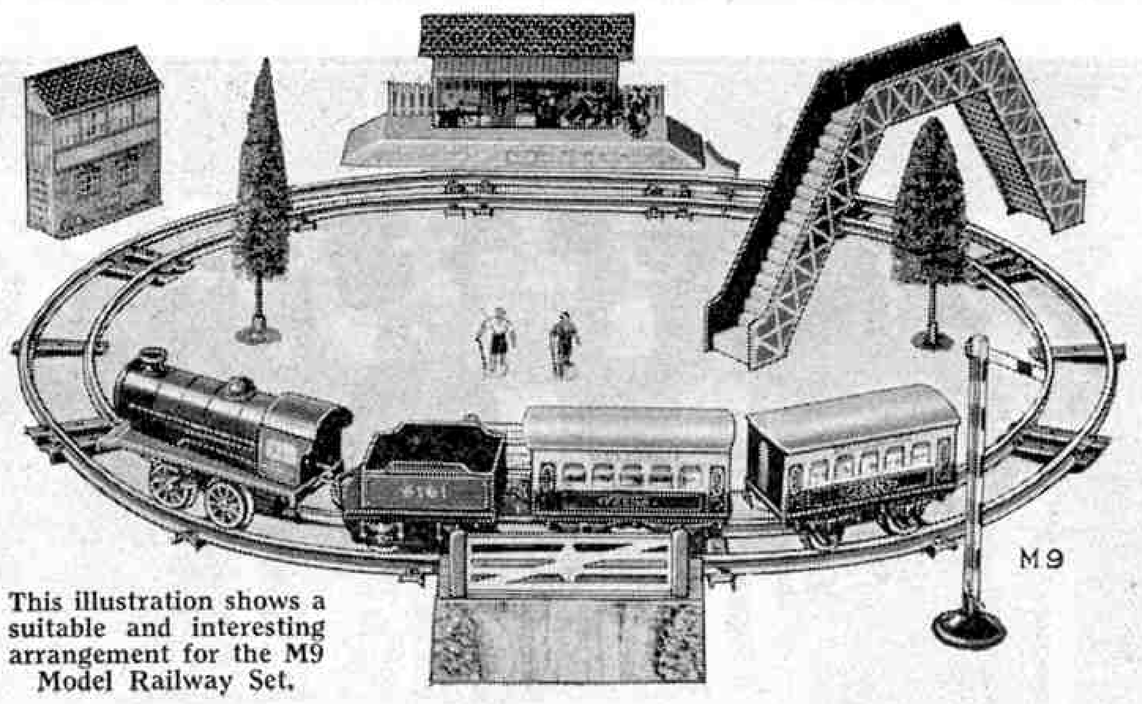
Charters Towers M.C.—There has been considerable model-building activity, and outstanding models recently completed have been a pithead gear and a fire engine. Club roll: 3. *Secretary:* R. McLean, Marion Street, Charters Towers, Queensland.

How to Choose a Hornby Train Set

The M8 Complete Model Railway Set packed in a strong cardboard box.

AT this time of the year large numbers of boys take up Hornby Railways for the first time. Running a Hornby Railway is one of the most fascinating pursuits in the world. One of its greatest attractions is that a miniature railway can be started on a comparatively small scale, and can be extended as its owner becomes more expert and tries to make his operations more and more like those carried out on real railways. With this in mind, a little guidance in the choice of a Hornby Railway to begin with is useful, and the various possibilities are explained simply and clearly in this article.

One of the first things to consider when buying a Hornby Train Set is the amount of space available. This is important because Hornby Rails are made to give two sizes of layout, one in which the radius of curves is 1 ft. and another in which the radius is 2 ft. If sufficient room is available there should be no hesitation in choosing 2 ft. radius track, for then there would be no difficulty in using any locomotive or coach in the Hornby Series. Where the width of the space to be used is less than 4 ft. 6 in., it is advisable to lay track of 1 ft. radius. This restricts the choice of trains to some extent. The smaller locomotives and rolling stock can be used, but larger engines, such as the 20-volt Automatic Reversing Locomotives, will not run on the small circles. Generally it may be said that a circle of 1 ft. radius track requires a space of 2 ft. 6 in. sq., and one of 2 ft. radius a space of 4 ft. 6 in. sq.



This illustration shows a suitable and interesting arrangement for the M9 Model Railway Set.

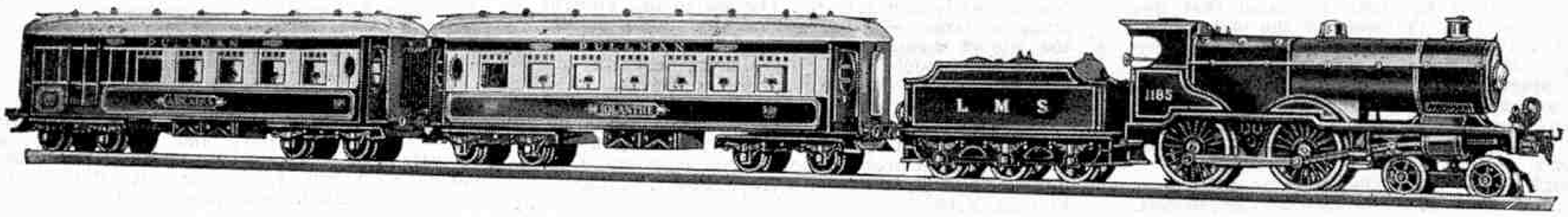
When this point has been settled, there comes the all-important question of the motive power to be used. Both clockwork and electric engines are available. The latter are simple to run, and there is no danger whatever with them. If the electric mains supply is Alternating Current, the ideal plan is to instal an electric layout on which to run 20-volt locomotives. Current should be supplied through a Meccano Transformer, which reduces the mains voltage to 20 volts, which is safe and suitable for railway working. All that is necessary is to connect the Transformer to a convenient source of power on the one hand, and to the track on the other. The cost of running such a railway is low, the current consumption being about equal to that of a 60-watt lamp.

Hornby locomotives of 6-volt type also are available, with Transformers to reduce mains current to the required voltage. Wherever possible the 20-volt system should be chosen, however, for this is electrically more efficient, and has the added advantage that the wonderful Hornby Automatic Reversing Locomotives are available in it. These can be started, stopped, controlled for speed, and reversed without any handling of the levers in the cabs, operations being completely controlled from the lineside. These locomotives are not available in the 6-volt system.

Where no mains current is available, or where the supply is Direct Current, those who wish to install a Hornby Electric Railway must make use of the 6-volt system, with a 6-volt accumulator as the source of power. An accumulator of good quality and with a capacity of 20 amps. should be used. The cost of recharging is about 1/– and satisfactory operation can be obtained, although this source of current is not so convenient as Alternating Current mains with a Transformer.

Finally there is the clockwork system. The Hornby Clockwork Locomotives have been brought to a state of perfection. They are now the strongest and best pulling engines of their type in the world, and are specially suitable for operating by time-table.

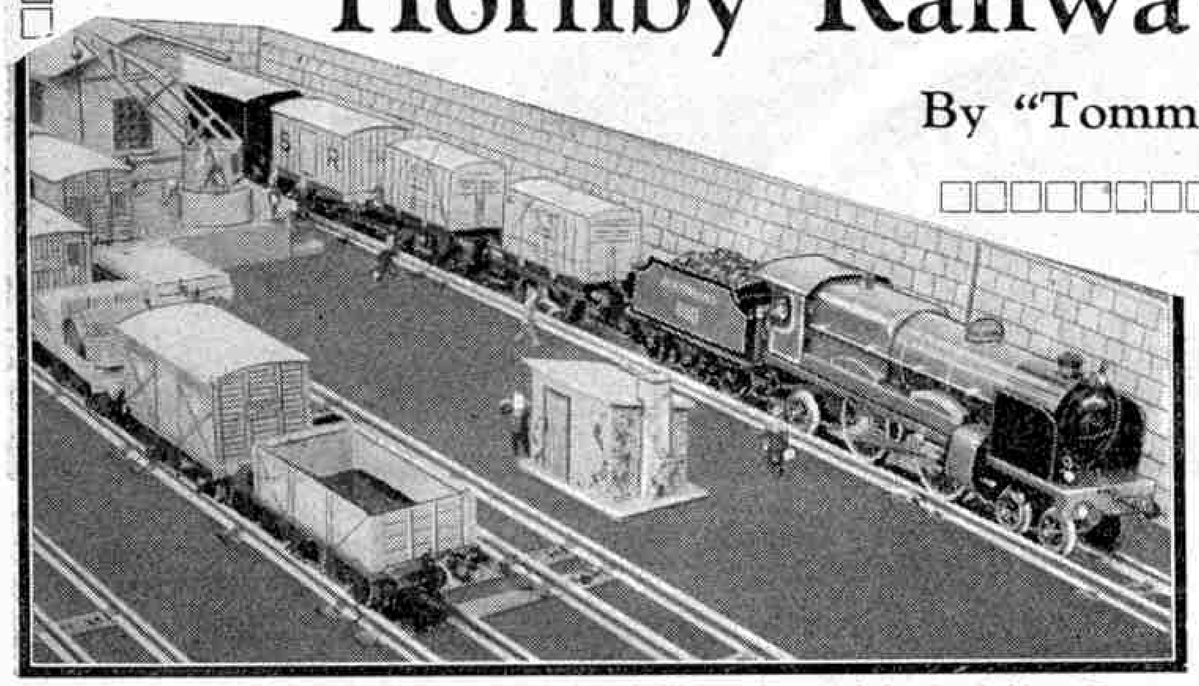
Even when the points already considered have been dealt with, the prospective owner of a Hornby Train Set will find himself confronted with a bewildering variety of wonderful products, in which there are locomotives of various sizes and types, together with a splendid array of rolling stock of all kinds. All four railway groups are represented in true colours, and a decision has to be made as to which of these shall be used on the miniature railway to be built up. Fortunately this usually is an easy problem to deal with, for most boys have their favourite groups, and are eager to reproduce these on their own layouts. Whatever their choice, they can settle down to fascinating railway working, and can make their layouts larger and more interesting, by adding accessories.



The well-known Hornby E220 Special Electric Train Set. L.M.S. Locomotive No. 1185, Standard Compound Class.

Hornby Railway Progress in 1936

By "Tommy Dodd"



The new S.R. Ventilated Containers shown in this illustration are being hauled by a Hornby No. 3C Locomotive "Lord Nelson," fitted with the smoke deflectors mentioned in the article.

EVERY year the range of products in the Hornby Series grows larger, and this year has been particularly noteworthy in this respect. The additions have included rolling stock, track components and accessories, all of which have been introduced with the purpose of adding to the realism of Hornby railway working, and a brief summary of them will be of interest.

First of all come the Containers. These are perfect replicas in miniature of those used by the four great railway groups, each of which is represented by one that is characteristic of important traffic on it. For instance, the L.M.S.R. is represented by a Furniture Container, "K.61," coloured in the familiar red of that company; and the L.N.E.R. container reproduces one used for goods generally, and is coloured brown. The G.W.R. and S.R. examples are respectively an Insulated Container enamelled white with black lettering, and a Ventilated Container in aluminium finish with green lettering. All are fitted with lifting tackle on the roof, and have a very effective appearance while being slung or when loaded on Hornby Flat Trucks and included in goods trains.

A new No. 1 Petrol Tank Wagon "Esso." This replaces the now obsolete "Pratts" wagon.

The new High Capacity Wagons will certainly make a strong appeal to all Hornby railway owners. There is an increasing tendency in railway working to make use of larger wagons, and the addition of this form of rolling stock to the Hornby Series will enable miniature railway owners also to follow this practice. The Hornby L.N.E.R. High Capacity Wagon represents the well-known 50-ton brick wagon that is particularly associated with the brick traffic from the Peterborough district to King's Cross. The G.W.R. 40-ton wagon for locomotive coal and the L.M.S.R. 30-ton wagon for similar duties are the other examples reproduced in the Hornby system, and each of the two miniatures is finished in correct colour and with appropriate lettering.

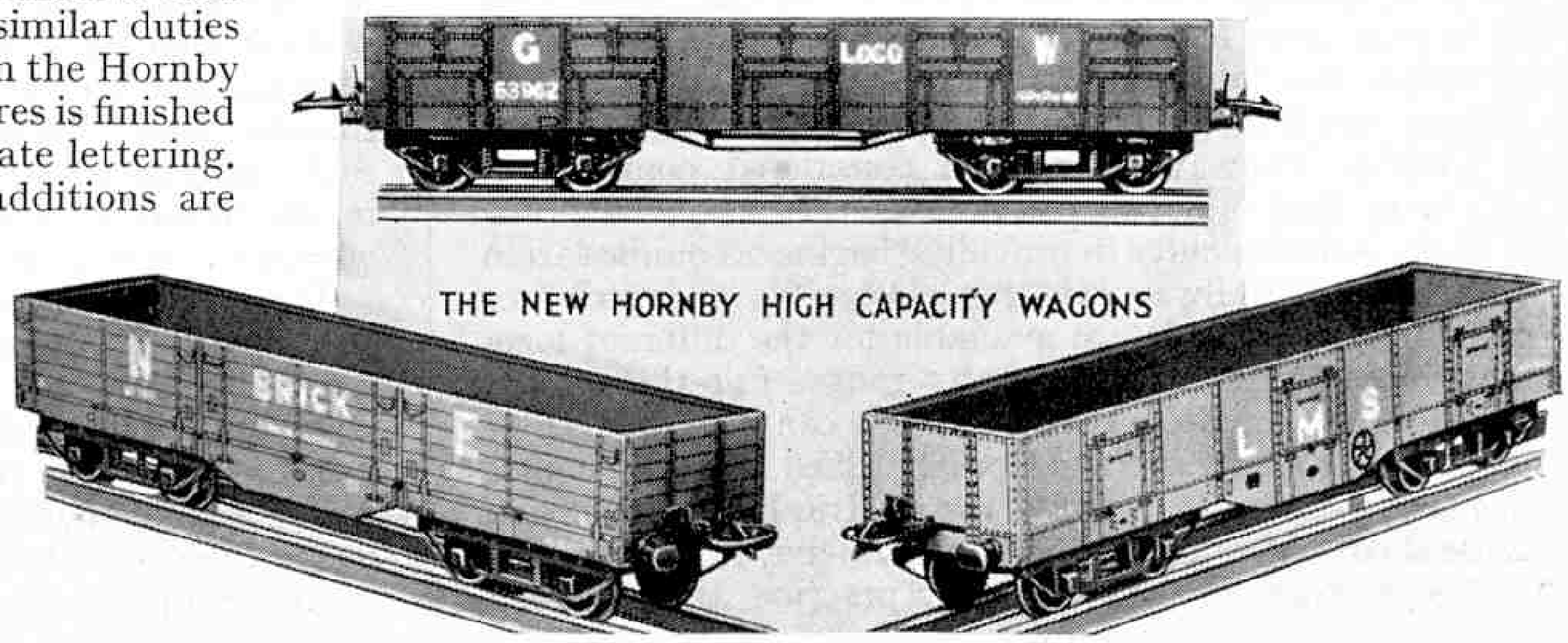
Other interesting rolling stock additions are two Tank Wagons, one for "Esso" petrol and the other for "Royal Daylight" oil. The "Esso" Tank Wagon replaces the now obsolete Pratt's Tank Wagon and is coloured in the familiar buff; the "Royal Daylight" wagon is coloured bright red as in actual practice. The Trolley Wagon fitted with Cable Drums is another attractive production. There are two Cable Drums on each Trolley Wagon, held in place by ropes. The Drums are miniatures of those used by British Insulated Cables Ltd. One of them makes an excellent load for a Flat Truck, and this combination is available in the Series.

To the Hornby electric track have been added Electric Points on a solid base. Both right-hand and left-hand points, known as ESPSR2 and ESPSL2 respectively, are available, and there is no fear of their switches moving while a train is travelling over them. These Points cannot be used with Hornby Double Track owing to the shape of the base; but those who wish to connect sidings or branch lines to double track can obtain special Points in which the lever is placed on the inside of the curve. The special Points with reversed switch sleepers are also useful in cases where sidings are being laid, and the lever of the standard Points would foul a nearby track.

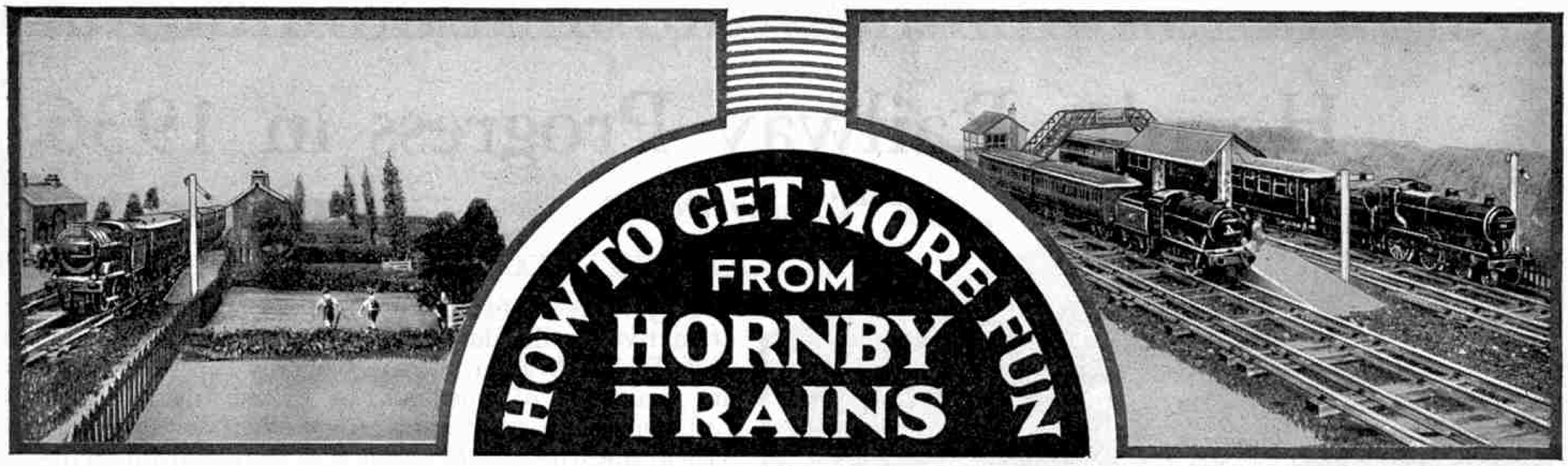
The Automatic Circuit Breaker introduced early in the year has already amply proved its value to owners of both 6-volt and 20-volt Hornby Railways. It is almost uncanny in its action. Whenever a "short" occurs, whatever the cause, there is a click, and the little red push button at the top of the circuit breaker springs upward. When the cause of the trouble has been found and matters have been put right, the button is simply pressed down again and train operation can be resumed immediately. This accessory saves the time and the trouble involved in winding lengths of fuse wire round terminals.

The "Royal Daylight" Oil Tank Wagon.

The appearance of the MO Locomotive has been greatly improved by the addition of piston rods. Originally these were not fitted to this engine, and the change has been made without adding to the cost. Another interesting feature is that smoke deflectors have been added to the Hornby L.M.S.R. *"Royal Scot"* and S.R. *"Lord Nelson"* of the E320 and No. 3C types, and also to the Nord Riviera "Blue" locomotive. Those fitted to the Hornby Nord engines are characteristic of the peculiarly-shaped wind shields used on French engines. The deflectors of the English type engines also are representative of those used in real practice. Illustrations of Hornby engines fitted with smoke deflectors were reproduced in the May *"M.M."*



THE NEW HORNBY HIGH CAPACITY WAGONS



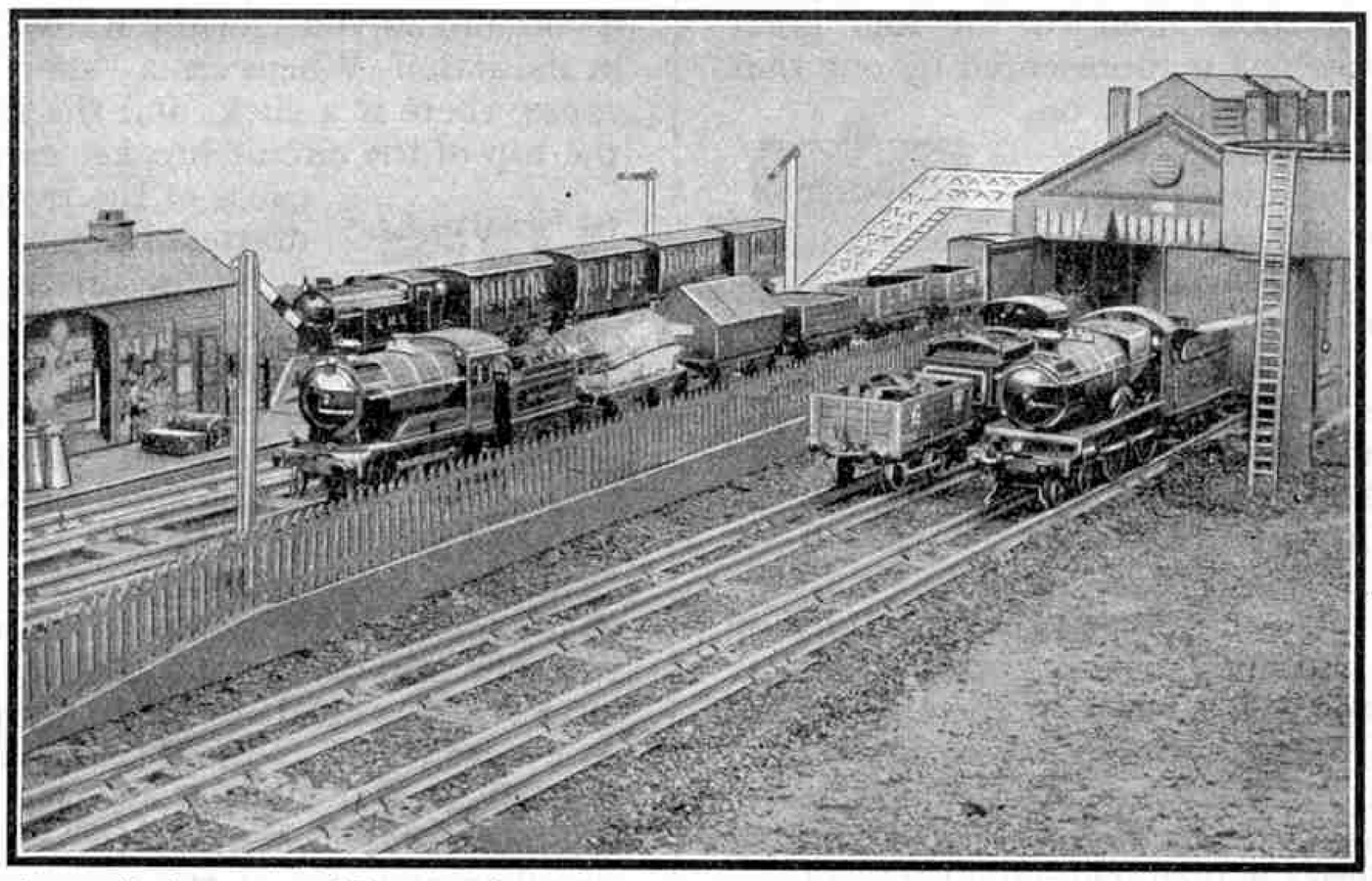
ENGINE SHEDS ON HORNBY LAYOUTS

ENGINE SHEDS play a very important part in the work of a railway. In a very real sense they are homes for locomotives, which are housed in them when not on duty and there receive the care and attention that is required to keep them in running order. On coming off duty, the engines themselves are cleaned, their fireboxes are cleared of ash and clinker, and the boiler tubes are blown out. The tenders are filled with coal and water, the fires are re-lighted and steam is raised, the working parts are oiled and greased, and everything generally is prepared for work before they again leave the sheds for another spell of duty. In addition much of the lighter repair work needed is carried out.

To the miniature railway enthusiast, an engine shed of course is wonderfully attractive, for there he can see locomotives of various classes, often in interesting stages of preparation for duty, and he can learn something of the inner details of railway life. He knows how necessary engine sheds are in ensuring locomotive efficiency, and naturally includes similar engine accommodation in his own layout in order to secure realism, and also because it is as useful to him as its counterpart is in actual practice. Hornby Engine Sheds are splendid storage places for Hornby engines, protecting them from dust and dirt when they are not in use. Their inclusion also adds greatly to the interest of miniature railway working, and it is no exaggeration to say that a Hornby Railway cannot be considered complete if an engine shed is not included.

There is no difficulty in providing engine accommodation on a Hornby Railway, whether clockwork or electric, for suitable engine sheds are available for the different locomotives included in the Hornby range. For the smaller locomotives the No. 1 Engine Sheds can be used. These have double track, and the No. E1E Shed, which of course has electrical track, is wired for electric lighting. Two of these sheds have double doors at each end, thus reproducing a feature of real railway practice that enables locomotives to be run right through the sheds, either in actual working, or for coaling or other purposes. The No. 1A Shed has doors only at one end, again as in many of the engine sheds in use on British railways.

All these engine sheds will accommodate any locomotive and tender with an overall length not exceeding $8\frac{3}{4}$ in. For larger locomotives, that with their tenders are not more than $17\frac{1}{2}$ in., there is a similar range of sheds available. Each of these has double track, and the No. E2E Shed is fitted with electric wiring for lighting in addition to its electrical track. Thus sufficient shed accommodation to house the locomotives used on a Hornby layout can readily be arranged.



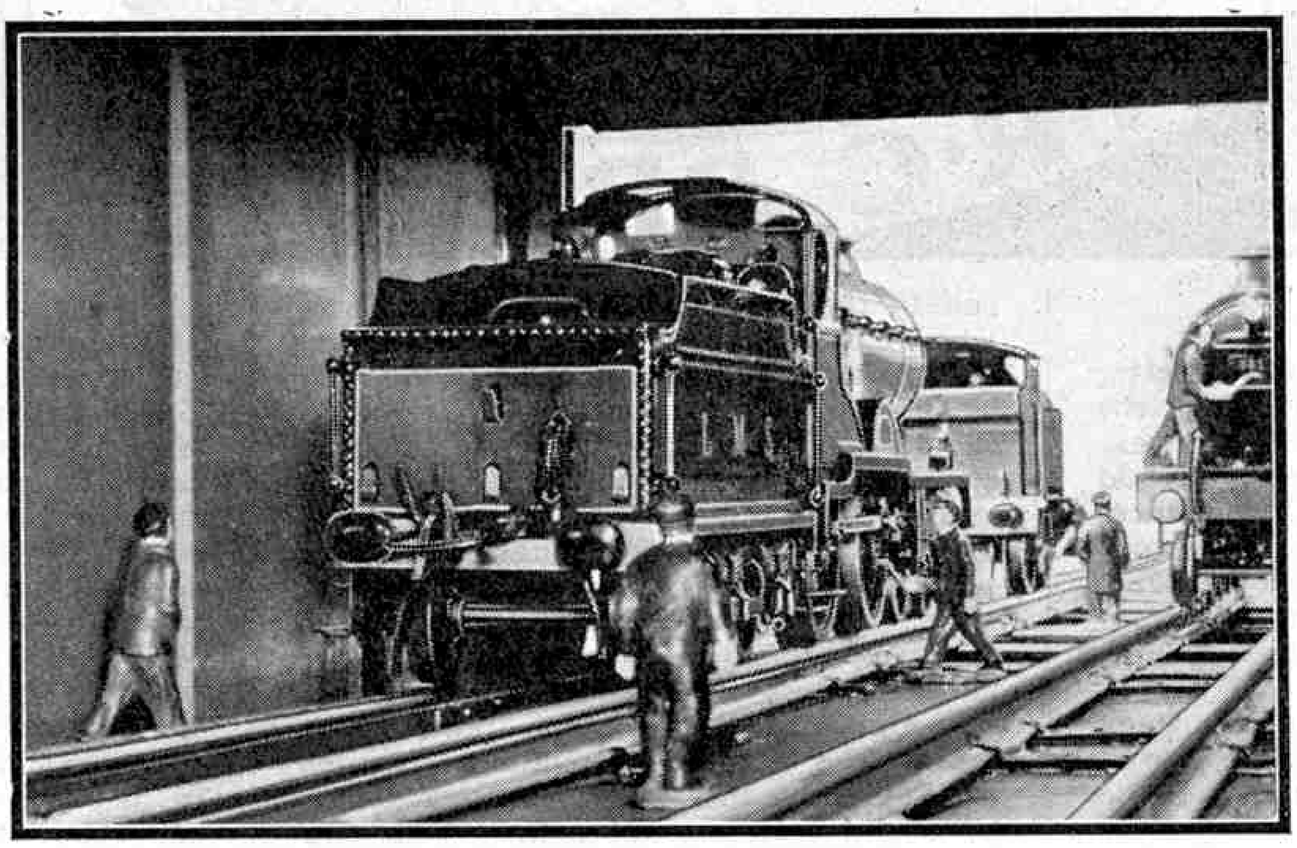
An excellent arrangement for an engine shed on a Hornby layout. The tracks leading to the shed can be connected to the main line in a simple manner.

The next thing is to decide where the engine sheds required are to be placed. This requires a little consideration if the best use is to be made of these accessories. In actual practice sheds are placed as near stations as possible, in order to avoid long runs, with perhaps complications in working, when the engines are on their way to and from their homes. This arrangement should be followed on model railways. If a layout has two termini, an engine shed could quite rightly be placed at each, and the locomotive stock could then be divided, part being placed in each shed. Space and other considerations sometimes make it impossible to plan a layout of this kind. Only one terminal may be provided, or it may be that with a continuous track there is simply one main through station. In each case the position of the engine shed accommodation is easy to settle, for it should be near the principal station, whether this is a terminus or not.

The most important thing in deciding upon the actual site is then the rail connection that can be made to the main line. This should be as direct as possible, so that engines going to their sheds or returning to the stations for duty are not compelled to reverse several times on the way. Another point that should be taken into account is the provision of space for the inclusion of a turntable. When an engine completes its turn of duty, and the coaches it has

hauled have been shunted into the sidings, it is usually run backward on its way to the shed, and it must be turned before it is sent out for its next turn of duty. The turntable can conveniently be included in the track leading direct to the shed, so that locomotives arriving for rest and attention are turned round immediately.

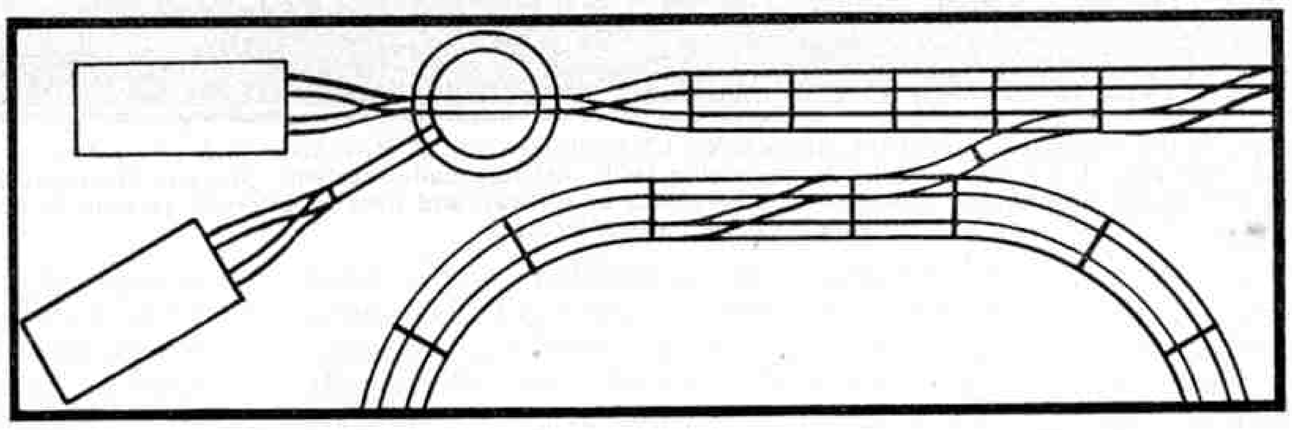
A useful method of incorporating engine sheds in a layout is that illustrated on this page. The accommodation provided is connected to the main line by means of left-hand points with reversed switch sleepers. A cross-over enables engines on each of the tracks of the main line to be run to the engine shed sidings without difficulty, and the sheds themselves are reached over the turntable. This is placed where it is most useful, serving both sheds directly, and at the same time space is saved by the arrangement adopted.



Activity in a Hornby Engine Shed. In this illustration a Hornby No. 2 Special L.M.S. "Compound" locomotive is being prepared for the day's duties.

Where two engine sheds are used together in order to accommodate a comprehensive range of locomotives, they can be placed side by side, but in another excellent plan, which is particularly useful on layouts where space at the side of the track is limited, they are joined end to end so as to make a long and narrow engine shed. If there is sufficient room, it is better to place them side by side, for then each locomotive can be taken into its shed or brought out with a minimum of shunting, so that time is saved in the complicated operations to be carried out.

Yet another suitable arrangement is that shown in the lower illustration on this page, to which reference has already been made. In this the sheds are placed separately in convenient positions, and each can easily be reached by means of a simple branch from the main line that passes over a turntable. In this layout other sidings are provided on the right. These can be used for engines off duty for short periods, or can be brought into use in connection with the layout itself as goods sidings. Wagons laden with locomotive coal can conveniently be shunted there while waiting their turn to be unloaded. If they are not required for these purposes they can be made to lead into a small terminal station, which would be a useful addition to the layout and also would add to the realism of the scene by placing the engine sheds and a station in association with each other.



A useful method of including an engine shed on a Hornby layout. The shed sidings are connected to the main line by means of left-hand points with reversed switch sleepers.

In regard to these arrangements, each layout of course must be dealt with on its own merits, but those who are planning the addition of engine sheds to their layouts will find some very useful examples in "Hornby Layouts—One Hundred Suggestions." Other interesting schemes are to be found in the descriptions of special layouts and of the railways of Hornby Train enthusiasts that are included from time to time in the Hornby Railway Company pages of the "*M.M.*" Many of these are designed to suit special circumstances, and those who are planning Hornby Railways for themselves, or extending their existing railways, can obtain many useful hints from them. For instance, on page 663 of last month's Magazine is a diagram showing a simple and useful engine shed layout in connection with a busy terminal station.

Good use also can be made of Hornby engine sheds for the storage of the Rail Gauge, Winding Keys, Shunter's Pole and other accessories that are required in miniature railway working. These should be kept at hand in order that they can be found at a moment's notice in emergency, and a convenient place in which to keep them is alongside the track in the engine shed.

It has already been pointed out that in actual practice locomotives coming off duty receive attention and are prepared for their next turn of duty in the engine shed. This is a practice that Hornby Railway owners could follow with advantage. When their engines finish duty they should be run light to the shed, and on arrival should be examined and given any little adjustment that may be necessary. By following this plan miniature railway enthusiasts not only have the satisfaction of carrying out operations in a really workmanlike manner, but also ensure long life and high efficiency in the working of their engines.

Clockwork locomotives do not require much attention. The mechanism must be kept free from dust, which can be removed by washing out the motor with a small paint brush dipped in petrol. Fresh lubricating oil of course should be applied when the petrol has evaporated, and all the moving parts of the engine, including the couplings, the axle bearings and the piston rods and crossheads, should be lubricated slightly. The leaves of the spring should have graphite grease applied between them.

Different treatment is needed by an electric locomotive. It would be harmful to wash its mechanism out with petrol, but the gears of the electric motor are outside the side plates, and therefore can be cleaned without difficulty. The commutator and brushes must be kept free from oil in order to keep the engine working at its best. The former can be cleaned from time to time by wrapping a piece of fine emery paper round the end of a match stick, and inserting this in the plain hole at the side of the motor below the commutator shaft while the driving wheels are revolved slowly by hand. This is the most effective method of cleaning the commutator.

Branch News

WIMBORNE GRAMMAR SCHOOL.—Better meetings are now being arranged, and the rules are being strictly enforced, with excellent results. The track engineer has relaid much of the Branch track. Attendances have been excellent, and more satisfactory train operation has followed the introduction of a better signalling system. Secretary: R. S. Partington, The Grammar School, Wimborne, Dorset.

GLENGORSE (BATTLE).—Regular track meetings have been held, and have proved very enjoyable. More rolling stock could be used with advantage, and it is hoped to overcome this difficulty as the number of members increases. Three enthusiasts have already joined the Branch, and it is hoped shortly to enrol others. Secretary: P. Ballard, Glengorse, Battle, Sussex.

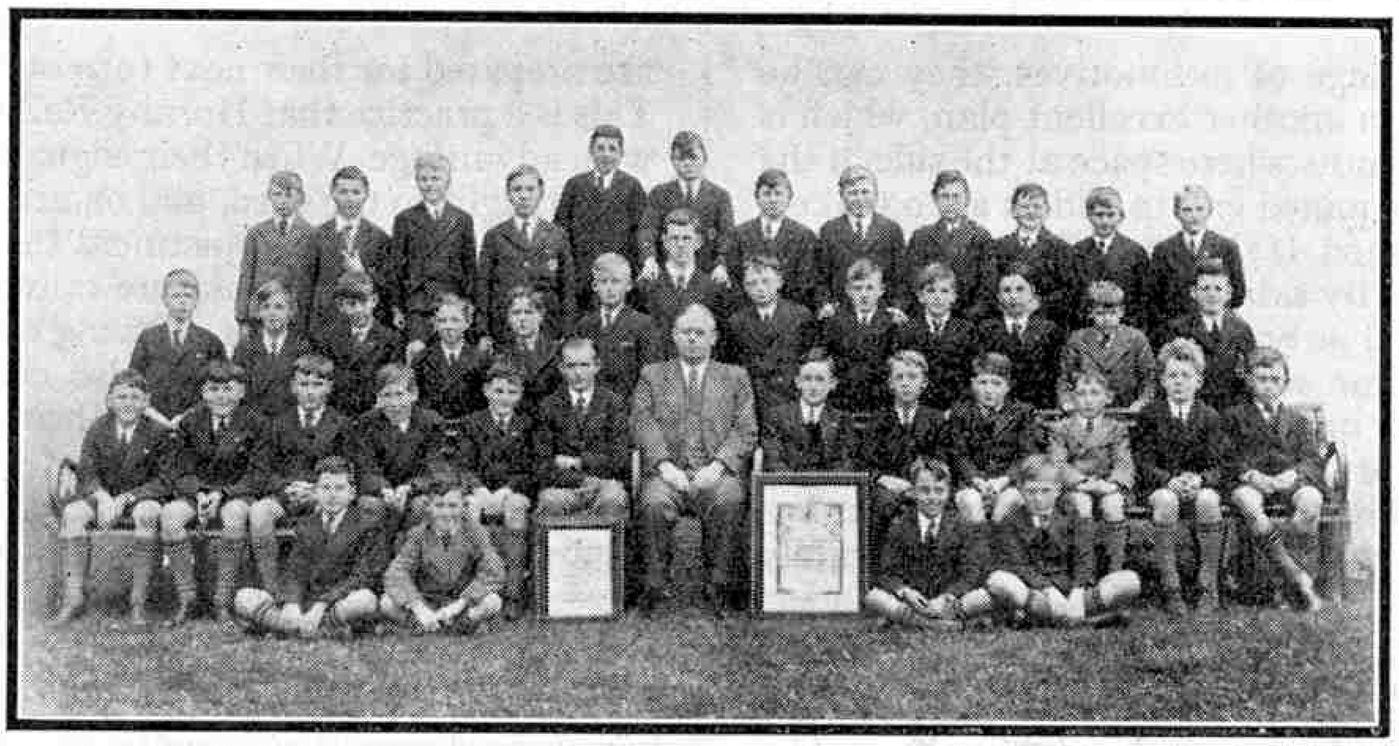
ISLINGTON.—The central feature of the recent Exhibition was a large Hornby Train layout, and other attractions included two ½-in. scale model locomotives, chemical demonstrations and a cinema show. Objects made by members on Hobbies Nights also were on view. At ordinary meetings track operations continue to be successful, and games have been enjoyed as a diversion. An interesting Lantern Lecture on *"Railways"* was given by the Secretary. A visit has been paid to the King's Cross Locomotive Running Department, where members saw the *"Green Arrow"* and the *"Silver Link,"* the whistle of which greatly interested members. Secretary: S. H. Gardener, 3, Tiverton House, Pleasant Place, Canonbury, London, N.1.

CHORLTON-CUM-HARDY.—The appearance of the Branch layout has been improved by the addition of miniature scenery, including an aerodrome, farm, road, and fields represented by cotton wool dyed green. A new train, the *"Scarborough Flier,"* was introduced at a recent track meeting. The Chairman is constructing a new main line station and its incorporation in the layout is eagerly awaited. It is hoped that more Hornby enthusiasts will join the Branch. Secretary: G. Gill, 56, Highfield Road, Chorlton-cum-Hardy, Manchester.

ELMSIDE (EXETER).—At track meetings timetable and "open service" operations are undertaken alternately. Trains are run to the wishes of individual members when "open service" running is carried out. A topical feature is the introduction of driving tests for members. This step should speed up operations and increase efficiency. A model Navy has been built, and naval manœuvres in miniature have provided interesting meetings. Secretary: K. Brewer, 18, Comins Road, Exeter.

ST. GILES' CATHEDRAL (EDINBURGH).—Members are now settling down in their new quarters, where they attend on the nights that suit them best. As a result the weekly attendance figures have greatly increased. The track has been laid and now all points, with two exceptions, are controlled from lever frames. A new colour-light signalling apparatus is being installed, together with automatic system for electrically operating signals from the points. Station and shed building has commenced, and it is hoped to complete the layout by the New Year. On the electric railway, a burrowing junction has recently been completed. The sight of a train suddenly diving under the baseboard and reappearing again causes much amusement. Recruiting is to be carried on with increasing vigour, the aim being a membership of 300. Secretary: H. W. Govan, 18, Ravelston Park, Edinburgh, 4.

FISHPONDS (BRISTOL).—Official positions are given to members taking part in track operations, who retain them for a month. The Branch locomotives have been tested for speed and strength. Goods and passenger train working have been carried out. Both G.W.R. and L.M.S.R. passenger trains are run, and for this reason two superintendents have been appointed. Timetable working is rigidly enforced. The Secretary has given a talk on *"Goods Traffic, Its Control and Handling."* This was followed by members telling railway stories. A Hornby 2E *"Bristol"* Station was presented to the Branch by the Chairman. Work is in hand on an electric railway for suburban train operation. Secretary: A. N. Ewings, 154, Thingwall Park, Fishponds, Bristol.



Members of the Whitgift School H.R.C. Branch No. 67. Chairman, Mr. F. Broadbent, B.A.; Secretary, A. F. Jordan. This Branch was incorporated in September 1929, and has made excellent progress during recent years. The varied programme includes visits to places of railway and general interest, as well as track meetings and lantern lectures.

AUSTRALIA

MELBOURNE.—Important alterations and extensions have been made to the Branch layout, and a bridge has been incorporated. High speed trains are now run successfully on the improved track. During operations, members hold various positions, such as those of drivers and signalmen, for periods of half-an-hour, and changes are then made. This arrangement allows members to become proficient in all phases of operation. A visit was paid to the Meadmore Model Co., Elswood, where members were very interested in a large model electric layout, with streamlined locomotives, and accessories, including colour-light signals. Secretary: L. Ison, 8, Hayes Street, Northcote, N.16, Victoria.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below.

LONDON—E. Fields, 2, Longstaff Crescent, Wandsworth, S.W.18.

SEAHAM HARBOUR—D. Smith, Police Station, Seaham Harbour, Co. Durham.

Branches Recently Incorporated

313. LOSTOCK GRALAM—A. Milligan, Wincham Hall, Northwich.

314. COPTHORNE SCHOOL—J. M. Workman, Copthorne School, Crawley.

An Attractive Exhibition

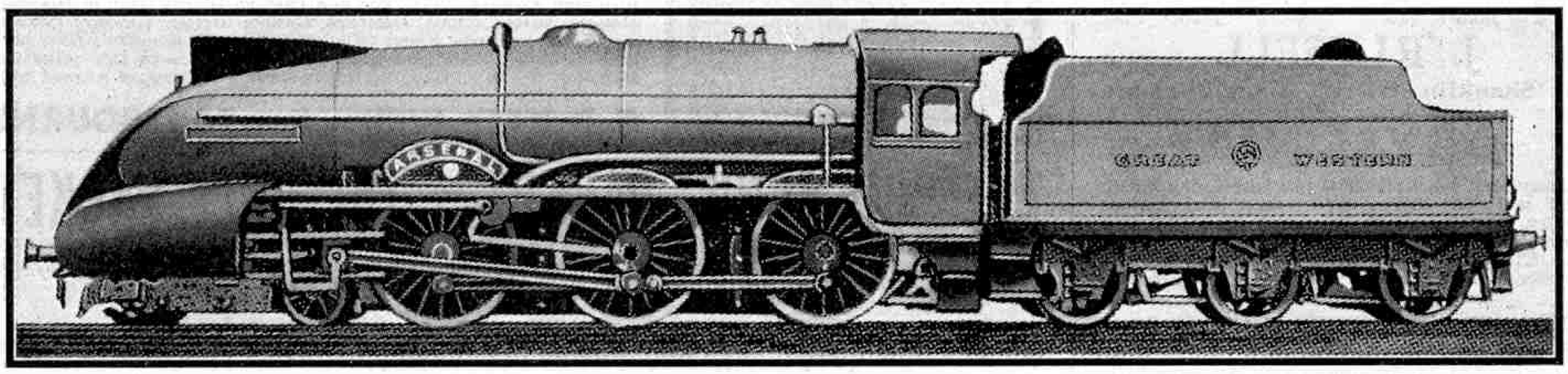
Hornby Railway Company members and Hornby Railway enthusiasts in Acton, London, W.3, and district, are invited to the New Membership Exhibition of the Acton Branch. This will be held at 35A, Birkbeck Grove, Acton, W.3, on 4th and 5th December. It will be opened at 7 p.m., and admission is free.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

A MYSTERY LOCOMOTIVE CONTEST

Join the Hornby Railway Company and become eligible for the competitions announced on this page.



H.R.C. members are keen critics of locomotive designs. They appreciate the good points of the engines of different railways, and are particularly interested in the outstanding features that distinguish those of each class. At times most of them have suggested improvements of various kinds, and many must have tried to work out the result, in regard to either performance or appearance, that would follow the incorporation in certain locomotives of parts that are peculiar to others. This is a fascinating pursuit that has given rise to many fierce arguments among railway enthusiasts.

How an entirely new locomotive design may be evolved by taking parts from existing British locomotives, and combining them into a single engine, is well shown by the composite locomotive illustrated on this page. It is not easy to see at a glance that this engine is an imaginary one, for the parts of which it is supposed to be made are fitted together so skilfully that even the keenest of H.R.C. members could be excused if at first they imagined it to represent a new class.

We are sure that all will revel in the detective work of tracing the origin of each part, and thus explaining how the composite engine has been built up. In our competition this month therefore we ask members to identify each portion, and to state from which class of locomotive it comes.

In the entries the names of each of the parts should be given, together with the class and wheel arrangement of the engines represented by them in the composite, and solutions should be as brief as possible, provided that the information given is sufficient to enable the locomotives mentioned to be definitely identified. Competitors must use one sheet of paper for their entries, and their solutions must be written only on one side of the paper.

The Contest will be divided into the two usual sections, Home and Overseas, and in each of these there will be awarded three cash prizes to the respective values of 21/–, 15/–, and 10/6. Several consolation prizes will be awarded.

Envelopes containing entries should be marked *"H.R.C. Christmas Contest"* in the top left-hand corner. Entries from competitors in the Home Section should be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, not later than 31st December. The closing date for Overseas competitors is 31st March, 1937.

Railway Jokes Contest

December is the most jovial time of the year, when everybody is in the best of humours and good jokes are told and funny stories exchanged around the fireside. We hope that all H.R.C. members will share to the full in the pleasures of this merry season, and as we should like to join with them in part of their enjoyment, we are asking them to tell us the best railway joke or story of those that are sure to be told when they meet other railway enthusiasts.

Entries in this contest should be snappy and original, as well as funny. There will be three prizes consisting of products manufactured by Meccano Ltd. to the values of 21/–, 15/– and 10/6 respectively in each section, Home and Overseas, and in addition there will be a number of consolation prizes.

Envelopes containing entries should be marked *"H.R.C. December Joke Contest"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st December. The closing date for entries in the Overseas Section is 31st March, 1937.

August "Mystery Stations Contest" Solution

No competitor was successful in gaining full marks in this contest. The First Prize was awarded to W. Lobb (11765), Broadley, Rochdale, whose entry had only one error.

The correct solution is as follows: LIME STREET (Liverpool), NEW STREET (Birmingham), FORSTER SQUARE (Bradford), CITADEL (Carlisle), CASTLE (Lancaster and Northampton), ST. ENOCH (Glasgow), WOODSIDE (Birkenhead and Aberdeen), GENERAL (Chester, Perth, Cardiff, Neath, Shrewsbury, Port Talbot, and Cymmer), WAVERLEY (Edinburgh), VICTORIA (London, Sheffield, Manchester, Nottingham, Swansea), FRIARY (Plymouth), PARAGON (Hull), TEMPLE MEADS (Bristol), WESTLAND ROW (Dublin), LONDON ROAD (Manchester, Nottingham, Leicester, Wellingborough, Brighton and Guildford), PRIORY (Dover), WELLINGTON (Leeds), BANK TOP (Darlington and Burnley), BANK QUAY (Warrington), PADDINGTON (London), KIRKGATE (Wakefield), FENCHURCH STREET (London).

COMPETITION RESULTS

HOME

October "Sharp Eyes Contest."—First: P. W. Gifford (48393), Winton, Bournemouth. Second: C. E. Wrayford (6039), Moretonhampstead, Devon. Third: N. C. Ferry (47001), Timperley, Ches. Consolation Prizes: D. Earle (41617), Wembley Park, Middx.; J. T. Fraser (2267), Exeter; J. L. Makin (30933), Penwortham, Preston; E. R. Dudley (37680), Carshalton, Surrey; D. Blackburn (49069), Kingsbury, London, N.W.9; L. J. Slater (49094), Cosham, Portsmouth.

October "Questions Contest No. 8."—First: G. L. Wilson (2478), Wormit-on-Tay, Fife. Second: J. L. Makin (30933), Penwortham, Preston. Third: K. W. Ashberry (14344), Cambridge. Consolation Prizes: M. Firth (26337), Huddersfield; J. C. Button (10335), Crewe, Ches.; R. Dace-Brown (623), Clapham Park, London, S.W.4; C. Howarth (11554), Broadbottom, Ches.; A. T. Royle (39381), Pendleton, Salford 6; A. R. Eves (35403), Boston, Lincs.

OVERSEAS

July "Errors Contest."—First: R. Pearson (29199), Richmond, Australia. Second: I. Brough (9112), Preston, Australia. Third: R. A. Wragg (7913), Bandikui, Rajputana, India. Consolation Prizes: A. Rodan (48081), Southland, New Zealand; R. Myburgh (37538), Claremont, S. Africa; W. B. Moore (20918), Toronto, Canada; J. A. Rodriguez (3647), Montreal, Canada.

July "Railway Photo Contest."—First: M. C. Lupton (43423), Elgin, S. Africa. Second: P. N. Roy, Calcutta, India. Third: H. Bennett (10615), Auckland, New Zealand.

SETS (POSTAGE EXTRA)

10	Australia ...	2d.	5	Fiji Is. ...	3d.
1	„ Jubilee	1d.	1	„ Jubilee	4d.
5	Barbados ...	2d.	5	Gold Coast ...	3d.
1	„ Jubilee	4d.	10	„ „ ...	6d.
4	Bermuda ...	3d.	1	„ Jubilee	2d.
1	„ Jubilee	4d.	3	Grenada ...	2d.
5	Brit. Guiana ...	3d.	1	„ Jubilee	2d.
1	„ Jubilee	2d.	5	Hong Kong ...	2d.
10	Canada ...	2d.	10	„ „ ...	5d.
3	„ Jubilee	4d.	1	„ Jubilee	3d.
4	Cayman Is. ...	6d.	20	India	6d.
1	„ Jubilee	3d.	4	„ Jubilee	6d.
10	Ceylon ...	2d.	5	Jamaica ...	2d.
1	„ Jubilee	2d.	10	„ ...	5d.
5	Cyprus... ...	3d.	1	„ Jubilee	2d.
10	„	6d.	5	Kenya	3d.
1	„ Jubilee	3d.	1	„ Jubilee	3d.

J. RUSSELL
23, Shanklin Drive, Westcliff-on-Sea

ABYSSINIA

A timely offer, which should not be missed, of a superb **MINT** set of 30 diff. stamps from this mysterious country, mostly 1917-31 issues (cat. over £1), with scarce **AIR STAMPS, COMMEMORATIVES, PICTORIALS, ETC.** Price 5/- only, secure them while you can. We offer superb collections of any country at bargain prices. Full lists FREE.

NORRIS & CO. (Dept.M), NORWOOD, LONDON, S.E.19

100 DIFFERENT STAMPS FREE to applicants for ½d. approvals.—Cox, 14, Broadmead Ave., Worcester Park.

Triangular, Octagonal and Rectangular Pkt. Free!!

Stamps of unusual shapes are always attractive and greatly increase the interest in your collection. This splendid packet of 34 different includes a beautiful new triangular stamp from Liberia, a large diamond stamp from Thessaly, and a rectangular map stamp of Cocos Islands, a large submarine Telephone issue, Turks and Caicos Isle, N.Z. Fantail Bird, set oblong Japan, and to the first 250 applicants, short sets from Hyderabad, Spain, New South Wales (100 years), and U.S.A. (including Roosevelt). Just send 2d. postage requesting approvals and free Catalogue.

LISBURN & TOWNSEND (M.M.), LIVERPOOL, 3

FREE WONDERFUL 1936 OFFER 25 NEW ISSUES AND NOVELTIES

Including **Andorra** (1935), fine new **Cayman Islands** (map of Islands), obsolete Austria, China, Denmark, **Gwalior** Service, Hungary (Statesman Szechenyi), **new Kenya** (Kavirondo Cranes), **Roumania** (new portrait of King Carol), and many others. I will send this collection **absolutely free** to all stamp collectors sending 2d. postage (abroad 4d.).

G. P. KEEF, Willingdon, EASTBOURNE

THE "DIAMOND" PACKET IS THE ONLY PACKET

OF UNSORTED STAMPS ON THE MARKET with 15 years' reputation behind it. It contains approx. **1,000 UNSORTED STAMPS** from Convents abroad. **MANY RARE STAMPS** have been found in it. 1 pkt., 1/6; 3 pkts., 3/9; 5 pkts., 6/-. All post free inland. Colonies 3d. per pkt. extra. Foreign, 6d. extra.

Ask your stationer for the "Diamond" packet.
SPECIAL: TURKS IS. JUBILEES complete set, used or unused, 5/6.

O. NERUSH (Dept. A), 68, TURNPIKE LANE, HORNSEY, LONDON, N.8

THE 'SHIP' PACKET

This marvellous packet is offered under cost as an advertisement, **45 different stamps each with a ship on it.** A regular armada. **GABOON,** New Issue **SENEGAL** (Canoe), wonderful flotilla of caravels from **DENMARK** (complete set), **NEW CALEDONIA, IVORY COAST, COSTA RICA,** a fleet of 7 **CHINESE** junks usually sold at 10d., **TRINIDAD & TOBAGO, MAURITIUS, SOUTH WEST AFRICA, NEWFOUNDLAND, U.S.A., B. GUIANA,** set of **S. AFRICA, GREECE, POLAND, INDO-CHINA, FRENCH OCEANIA,** etc. Price **4½d.,** postage 1½d. (abroad 3d. extra). Purchasers of this packet asking for approvals receive **FREE** set of **3 SPAIN** (Columbus, each with his ship on it). Senders of addresses of stamp collectors receive **FREE** set of **6 VENEZUELA** or **6 PERSIA, 100 BRITISH COLONIALS 1/-, 20 AIRPOST 6d., 6 TRIANGULARS 6d., 50 PERSIA 4/-, 2 ASTRID** (mourning stamps) **2½d., VOLUMES OF B.O.P. CHEAP.**

H. C. WATKINS (M. Dept.), Granville Road, BARNET

FREE FOUR of the **FINE TRIANGULAR STAMPS** recently issued by various countries, **FREE** to applicants for Approvals enclosing 2d. (abroad 4d.) for Postage.

DECEMBER SPECIALS

3	Bahamas ...	3d.	1	Malta Jubilee ...	2d.
4	Barbados ...	3d.	4	Negri Sembilan, mint	6d.
3	Basutoland ...	4d.	6	New Guinea ...	9d.
4	Bechuanaland ...	5d.	1	N.Z. Air, used ...	2d.
4	Queen Astrid ...	10d.	3	N.Z. Air, 1d., 3d., 6d. mint ...	1/3
3	Belgian Olympic Games... ...	9d.	4	Pahang, mint ...	6d.
6	Belgian Congo ...	3d.	4	Papua Ann., cpte	1/3
5	Bijawar ...	10d.	4	Perak, mint ...	6d.
5	British Honduras	6d.	12	Porto Rico ...	7d.
2	British Somali ...	3d.	2	Raratonga ...	4d.
2	Brunei	2d.	7	San Marino ...	5d.
5	Cayman Islands	4d.	4	Selangor mint ...	6d.
3	Chili Airmails ...	3d.	9	Soloman Ids., ½d. to 1/- mint ...	3/6
3	China, Postage Due	2d.	5	Timor	3d.
3	Chinese Turkestan	2d.	3	Tonga	4d.
1	Cyprus Jubilee...	2d.	7	Transjordan ...	8d.
5	Hejaz-Nejd ...	6d.			

15 Different Mozambique Company, **AIR ONLY,** Price 1/10.

All Orders Postage Extra.

A BONUS of 25 best quality sorting envelopes will be given free to purchasers of not less than 2/6 worth, and a BONUS of 50 ditto., a good assortment of sizes, will be presented to all purchasers of not less than 5/- worth from this advertisement.

EDWARD SANDELL, 10, Evelyn Grove, Southall, Mx.
All Business by Post.

The NEW "TRANSPORT" Packet

Contains a wonderful assortment of **44 foreign** and colonial stamps including the following which depict various means of transportation, **Tunis** (water carrier), **Senegal** (bridge and boats), **Mauritania** (crossing desert), **Mid. Congo** (train and bridge), **Sth. Africa** (ship), **Germany** (aeroplane), **Austria** (horseman), **Indo China** (boat), **Mozambique** (aeroplane), **Gaboon** (raft), **Greece** (bridge and liner), **St. Pierre and M.** (trawler), **Fr. Guinea** (native carriers), **Dutch Indies** (Steamboat), **Madagascar** (native transport), **Brazil** (aeroplane), **Belgium** (train), **Roumania** (aeroplane), **Newfoundland** (steamship), **Fr. Morocco** (camels). **Price 6d.** All purchasers asking for approvals will receive large **Ceylon** pictorials free.

BURDOCK & FLURY,
4, MARLBOROUGH ROAD, LONDON, S.W.19.

SOUTH-WEST AFRICA PACKET FREE!

This wonderful pictorial packet contains the following issues: South-West Africa (Gom-pauw Bird, as illustrated), Jugo-Slavia (**Boy King**), **Vatican** (**beautiful Lawyers Congress commemorative**), Guadeloupe (Sugar Mill), Oceania (Native fishing), **Austria** (**Mint Parliament commemorative**), St. Pierre (Lighthouse), and new **Australia Telephone commemorative.** To obtain this fine gift **ABSOLUTELY FREE** simply request approvals and include 2d. postage. (No approvals sent abroad.) Price of packet alone, **9d.**

MICHAEL HERBERT (M.M.), 8, WOODSTOCK ROAD, WALTHAMSTOW, LONDON.

CHRISTMAS PRESENT NEWS.

COLONIAL STAMPS OF THE NEW REIGN

Arrangements have been completed for the despatch of

FIRST-DAY COVERS OF KING EDWARD VIII from each of the 64 Dominions and Dependencies as and when issued on the day of issue. Ensure genuine postmarks by having, delivered by your own postman by nearly every delivery for months, the new stamps direct from all parts of the Empire.

PRICES:

½d., 1d., 1½d. (and where issued ¼d.) from each of 64 Colonies £1 10 0
As above, but to 3d. value £4 0 0
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Prices for intermediate values, single Colonies, and single Cover on application. All Covers will be registered, except the £1 10 0 set, and not more than four stamps will be used on any one cover. Covers will be of exclusive souvenir design.

WHICH COLONY WILL BE NEXT?

It is no longer possible to have first day covers posted from the British Post Offices in Morocco. October 26, 1936, was the date of issue. Do not miss any more.

Orders should be placed at once for unused stamps of King Edward, also. These will be delivered on the day after issue.

ARCHIBALD F. McQUARRIE,
161a, Strand, London, W.C.2, England
TEL.: TEMPLE BAR 8642.

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I specialise in Brit. Col. approvals and will send you an absolute bargain selection of pictorials (Jubilees if required). Do you want current, recent or what issues?
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This selection is not made up of the very commonest varieties, but contains stamps catalogued at 1/- each or more. (I do not sell less than 100.)

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6	Canada "Jubilee"	U 2/3	9	St. Lucia ½d. to 1/-	M 3/9
11	Canada Current Set	U 3/-	4	Straits Jubilee	M 2/9
3	Canada Coil	U 3d.	4	S. Rhodesia	M 2/9

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11	Morocco and Tangier, King Edward VIII, Mint	1/-
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4	Japan 1936 National Parks, Complete Mint	7d.
55	U.S.America different, Used	9d.

Post 1½d. extra. Selections from 4 a 1d. (30 for 6d.)
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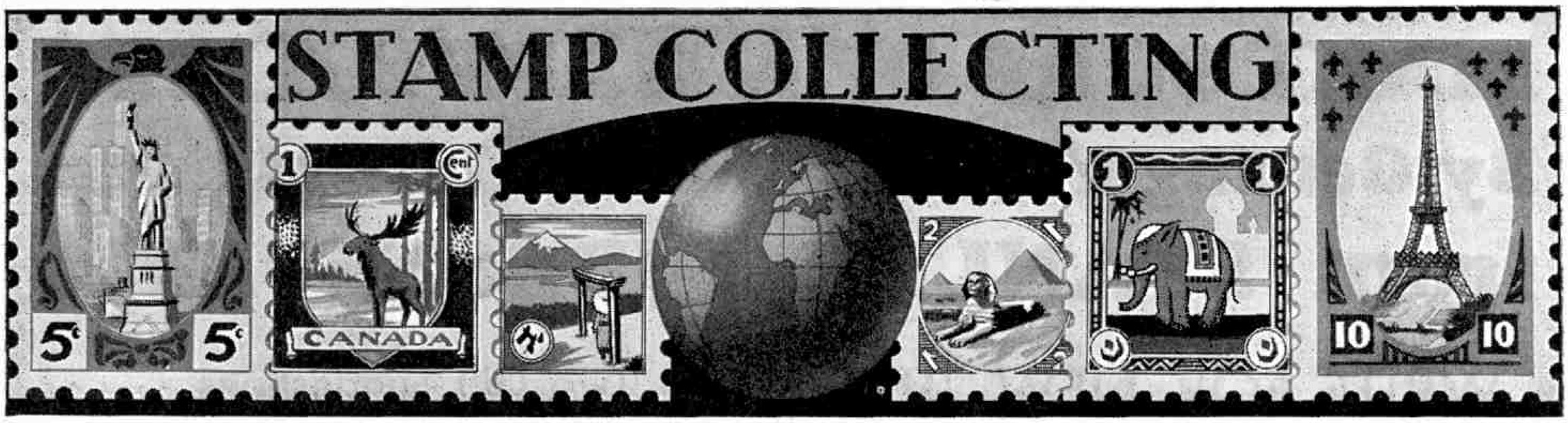
RARE RHODESIA (cat. 4/6), or 500 stamp mounts free to approval applicants. Good discount.—Winter, 89, Cobham Road, Seven Kings.

ALL BRITISH COLONIAL APPROVALS

Fine **BRITISH COLONIAL PICTORIAL SETS OF CAYMAN ISLANDS and GAMBIA FREE** to all Collectors sending 2d. in stamps and requesting **ALL BRITISH COLONIAL APPROVALS. BRITISH COLONIALS ONLY** on approval at bargain prices, including **JUBILEE** and **NEW PICTORIAL ISSUES,** West Indies, East and West Africa, Cyprus, Iraq, Newfoundland, Papua, and many other fine Colonials. (No stamps sent Abroad.) **C. H. SHAW (Dept. M.12), 95, CHRISTCHURCH AVENUE, KENTON, HARROW.**

See also other stamp advertisements on pages 744 and 746



THE STORY OF THE MOTOR CAR IN STAMPS

IN recent articles we have pointed out how interesting it is to collect stamps with designs that illustrate some special subject. There is a wide choice of subjects of this kind, for in whatever direction a collector's interests may lie, he can find stamps connected with them.

Stamp collectors among Meccano and Hornby Train enthusiasts are particularly well placed in this respect, for there are many stamp with designs illustrating the different branches of engineering. Pictures of ships, locomotives, aeroplanes and bridges are comparatively common features of modern stamps, and even the construction of roads has been well illustrated. In addition there are certain branches of engineering to which only a few stamps have been devoted. The story of the motor car provides an example of this kind, for there are less than a dozen stamps that deal directly with it. There are, however, other stamps connected with this subject that might well be included in a small collection, and the limited number of stamps to be acquired makes it easy for a collector with small resources to obtain a set that is complete.

It is difficult for modern boys to realise the days when motor cars were novelties, for they are accustomed to seeing highways crowded with cars and lorries of various makes. Yet 20 years ago cars were still rare, and only 10 years before that mechanically propelled vehicles were limited to a speed of 3 m.p.h., and even then had to be preceded by a man carrying a red flag. In those days motor cars were called horseless carriages. This was an apt description, for they closely resembled the carriages of that time, as is shown in our illustration of the 4c. stamp from the United States Pan-American Exhibition Series of 1901. This stamp is of particular interest, as it was the first to show a motor car in its design.

When we turn to other motor vehicle stamps, we find that they do not include reproductions of private motor cars in their designs. There are several showing commercial vehicles, however. For instance, the 50 h. stamp from the Bosnia and Herzegovina issue of 1906 and the 15 c. United States parcel post issue of 1912 both show Post Office vans of the times at which they were issued. These vans have high bodies, solid tyres, and spoked wheels, and are in striking contrast with the modern van shown on the 10 k. express delivery stamp issued in Russia in April 1932, and illustrated on this page. Another type of van is to be found on the United States 20c. special delivery stamps of 1925, also illustrated. This is not so modern as the Russian example, but represents a great advance on the vans shown in the two early stamps to which reference has been made.

Among the more interesting modern developments of the motor car has been the construction of vehicles suitable for travel across difficult country. The introduction of creeper track has played a great part in this, for cars fitted with it can travel over soft sand, in which ordinary wheels would sink, and as a result motor vehicles have penetrated into the Sahara Desert. A reminder of this is the 1 fr. design of the Child Welfare series issued in Tunis in February 1928. This stamp was issued to mark the opening of a motor service across the Sahara Desert from Tunis to Lake Chad, and shows one of the vehicles specially designed for the arduous conditions met with on its desert journeys. The stamp is illustrated in the bottom left corner of this page.

Another specialised form of motor vehicle that will provide stamps for the enthusiast making a special collection in connection with this subject is the agricultural tractor. Examples of this type of motor vehicle again come from Russia, where of course great efforts have been made to develop tractors for agricultural work in the immense wheat growing districts. A 5r. value was issued in August 1923 to commemorate an agricultural exhibition at Moscow, and the 10k. value of the 1929 Industrial Loan Propaganda issue also showed heavy agricultural tractors at work. Yet another tractor design from Russia is the 15k. value of the 1933 series commemorating the 15th Anniversary of the revolution of 1917. It is interesting to see that these tractors are fitted with rubber creeper tracks. Winter conditions in Russia are too severe for metal tracks. In 1930 experiments therefore were made with rubber tracks, and it was found that ice and snow do not cling to the joints and clog the mechanisms.

As would be expected in view of the immense extent of country devoted to the growing of wheat and other cereals, Canada also can provide an example of a stamp showing a tractor, and this is the best of its kind that has yet appeared. The stamp is the 20c. value, issued in 1930, and shows a tractor with creeper track hauling a modern reaper and binder.

A stamp collection illustrating the development of the motor vehicle would not be complete without including the two stamps issued by Germany in February last to commemorate the 50th anniversary of the invention of the motor car. These two stamps, issued during the holding of the 1936 Berlin Motor Show, bore portraits of Gottlieb Daimler (6 pf.) and Karl Benz (12 pf.), the famous motoring pioneers.

Daimler was working in a factory devoted to the manufacture of gas engines, when, in 1884, he designed a light compact engine in which petrol was used as fuel. In 1885 he fitted this engine to a bicycle and later to a "motor carriage." Karl Benz was the first to apply the petrol motor to light and practical road vehicles. His first car was produced in 1885 and its engine was rated at ¾ h.p. The car had three wheels and was capable of 6½ m.p.h.

Designs illustrating pedal and motor cycles would be interesting inclusions in this collection. The 5k. stamp from Russia's Express Delivery series illustrated on this page is an example. It was issued in 1932 as a companion to the 10k. stamp already mentioned.

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FREE To genuine approval applicants, and to purchasers of any of the under-mentioned packets: Set of 9 Georgia **Complete to 5 Roubles;** 15 Colonial **Jubilees** (Different) 1/6; 20 at 2/3; 25 at 3/–. 30 **Commemoratives,** all different, Colonial and foreign 1/3. 9 **Ceylon.** 2c.—30c. K.G. Pictorials fine used 1/–. 60 **British Colonials** (Only Pictorials, Comms. and Jubilees) 3/3. 100 **Persia** 2/9. 100 **French Colonials** 1/6.
Cash with order—postage extra.
T. R. Hughes, 'Ibis Cottage,' Long Park, Amersham.

LIBERIA TRIANGULAR AIRMAIL

FREE. For 30 days (abroad 60 days) we offer our special gift packet including new **Liberia Triangular Airmail** and **King Edward VIII Morocco** free to applicants for our Approval Sheets. Write for a selection. You need not purchase any unless our prices tempt you.
Department 254
ERRINGTON & MARTIN
LONDON, E.9, ENGLAND

New Greek Air Mail FREE
along with 25 other different stamps. Say whether British Colonial or Foreign preferred—to applicants sending 2d. in stamps and requesting our Booklets of Stamps. Special discounts allowed.
The BRAMLEY STAMP CO.,
TOWN END, BRAMLEY, LEEDS.

BIG XMAS SURPRISE As a special XMAS surprise to you we are giving a monster gift collection of stamps FREE. Included in this wonderful lot you will find beautiful **BELGIUM** mourning issue of the tragic Queen Astrid; obsolete **ABYSSINIA** showing one of the old Emperors; **PALESTINE** printed in three languages, fine **ROUMANIA** Air Stamp and pictorial **SOUTH AFRICA;** bi-coloured **FINLAND; FRENCH COLONIALS;** attractive late King Fuad of **EGYPT;** historic **AUSTRALIA** comm.; quaint **IRAN** of Riza Shah Pahlavi; scarce provisional **ANDORRA; SALVADOR;** several stamps of countries from which you may not have got any (**BARANYA, DECCAN, HYDERABAD, SCHLESWIG, etc.**); old **CAPE OF GOOD HOPE** showing 'Hope' and Table Bay; a set of pictorials from an **INDIAN NATIVE STATE; CYPRUS** and **NIGERIA** issues that will be withdrawn in a few months; **DANZIG; DENMARK; GOLD COAST** depicting old Castle; unusual 'Child Welfare' from **MEXICO;** pictorial **NEWFOUNDLAND** showing Twin Hills and Tors Cove; an Air issue from **BRAZIL,** and others. All good stamps, all different and ALL FREE to you if you send 2d. stamp and request one of our 'Grey' booklets of stamps on approval. Our Price Lists of 'Albums and Accessories' and 'Single-Country Packets' sent free on request.
WINDSOR STAMP CO. (Dept. M.), 59, LEE ROAD, BLACKHEATH, S.E.3.

He Who Hesitates is Lost

All George V current colonials will very shortly be obsolete. Don't leave it until it is too late. Here's your chance to get them before they become scarce. Buy an Empire Packet, guaranteed to contain only unsorted British Colonials sent out exactly as received from Banks, Trading Stations, and other Outposts of the Empire.

An Empire Packet is the cheapest and best way to fill up the gaps in your British Colonial Collection, includes Silver Jubilees, Commemoratives, New and Obsolete Issues, and heaps of other attractive stamps, 100 for 1/–; 250, 2/–; 500, 3/9, 1,000, 7/3.

All Post Free (Abroad 3d. extra).

I am giving to all purchasers of 3/9 and over a Queen Victoria Labuan stamp cat. 2/6. Remit by Postal Order only.

K. HUMPHRIES (Dept. M.),
East Wittering Road, East Wittering, Chichester, Sussex.

MINT AUSTRALIA, KENYA, 20 British Colonials and Peru, catalogued 3/6, free to approval applicants. Postage 2d.—P. R. Lincoln, High Road, Potters Bar.

47 different ITALY inc. Commems, 2d. only. Swell approvals. We pay postage both ways.—LGS, 3, Houndsden Road, London, N.21.

DID YOU GET

the free set I offered last month? This month you have the choice of two, Exhibition Set or Red Cross Set. Write for approvals, a postcard will do and say which set you want. NO POSTAGE REQUIRED.

C. A. MASTERS, BROADSTONE, DORSET

STAMP WALLET

FREE (Size 5¾″×3¾″), fitted with **PERFORATION GAUGE,** etc., and containing **LIBERIA AIR MAIL (TRIANGULAR),** set of **ROUMANIA (AVIATION), BELGIUM** (Antwerp and Brussels Exhib.), free to Approval applicants enclosing 3d. (Abroad 6d.) for postage and packing.
A. B. LEWIS, Dept. C.6,
16, Cricklewood Lane, London, N.W.2.

THE VERY THING

stamp collectors require is our Exchange Stamp Pocket Wallet. Made in Rexine, covered in Leatherette, and contains two gussetted compartments. Free stamps given with each. Can also be used for exchange Cigarette Cards. Send Postal Order (not stamps) for **7d.** to
J. R. MATTHEWS LTD.,
22, Charterhouse Square, London, E.C.1.
Established 1860.

LINER STAMPS

ALBUM. 650 different Stamps, Pictorials, Ships, Birds, Animals, Airs, Triangles, 1,000 Mounts, Tweezers. Lot 8/6, post 6d. Smaller lot 5/–. Fine Gifts. Approval Selections.—M.S.P., 55, High St., Battersea, London, S.W.11.

See also other stamp advertisements on pages 742 and 746

Stamp Gossip

and Notes on New Issues

Winter Charity Stamps

The annual Austrian Winter Relief charity stamps were issued early last month, and consisted of a set of four most interesting allegorical designs as follows: 5gr., St. Martin's Cloak; 12gr., succouring the sick; 24gr., St. Elizabeth distributing bread; 1 schilling, the Fire of Charity.

Four of the values for the German "Winterhilfe" (winter relief) series appeared in September last, and bore designs illustrating the great new motor road from Munich to the Swiss Frontier. We illustrate the 3 pf. value which shows a general view of the road as it sweeps through pine forests and over mountains. An interesting feature of this new road, incidentally one that is common to all the great arterial roads recently constructed in Germany, is its great width of nearly 150 ft. A grass verge in the centre divides the road into two separate tracks and, as our illustration shows, cross roads are carried over on bridges so that traffic on the main road may flow unhindered.

The remaining designs of the September issues were as follows: 6pf., a bridge over the river Saale; 12pf., an alpine stretch of the road; 25pf., the bridge over the river Mangfall. A further five stamps for the series appeared at the end of October and bore designs as follows: 4pf., the Munich Motor Road; 5pf., the Nuremberg Memorial; 8pf., Deutschland Hall, Berlin; 15pf., the Fuhrerhaus, Munich; 40pf., an exterior view of the Munich Art Gallery.

The annual Luxemburg charity issue was due to be placed on sale on the first of this month. This set comprises six stamps each bearing a portrait of Wenzel I, Duke of Luxemburg (1353-1383). This issue will remain on sale until 31st January next.

A Mexican Motor Road

The opening of the new motor road between Mexico and Laredo has been commemorated in Mexico by the issue of six special stamps, three for general postage and three for air mail use.

We illustrate the 10c. air stamp which shows a view of the Tasquillo Bridge over the Rio Tula, one of several bridges in the course of the road. The remaining designs are as follows: Postal stamps; 5c., a symbolical map; 10c., the Matalote Bridge; 20c., a general view of a stretch of the road. Air stamps: 20c., the Rio Corona Bridge; 40c., Guayalejo Bridge.

Czecho-Slovakian Pictorials

The recently issued Czecho-Slovakian pictorial series is one of the most attractive scenic sets that we have seen. It contains nine stamps, ranging in value from 1.20k. to 10k.

We illustrate two of these, the 4k. and 10k. values. The 4k. shows a view of Podebrady in Bohemia. The statue in the foreground commemorates George of Podebrady, one of the most famous of the old-time Czech kings, who reigned in the middle of the 15th century. In the background is the king's castle. The 10k. stamp shows a pretty riverside view of the Danube at Bratislava. The castle on the hillside was built rather more than 600 years ago and was the home of the Hungarian kings. It was destroyed by fire in 1811, and has remained in its ruined condition ever since.

The remaining designs are as follows: 1.20k., Castle Palanok, near Mukacevo in Carpathian Ruthenia. The site has been a military fortification from very early days and the castle shown in the stamp dates from 1360. 1.50k., Banska Bystrica, an old Slovakian mining town. 2k., the castle of Zvikov in Bohemia. The castle is perched on a rocky eminence between the Vltava and Otava rivers. It dates from the 12th century. 2.50k., the castle of Strecno in Slovakia. 3k., the castle Hruba Skala. 3.50k., the Slavkov Castle in Moravia. 5k., the Masaryk Square at Olomouc in Moravia.

* * *

The 1937 Paris International Exhibition has been preceded by the issue of a short series of six postage stamps, values 20c. to 1f.50. The four lower values bear a design depicting a herald sounding a fanfare at the opening of the Exhibition. The two higher values, the design for which is illustrated on this page, bear an allegorical design showing a curtain being drawn back across the globe typifying the Exhibition's revelations of world wonders.

Edwardian Meter Marks

Readers who are collecting meter marks should be on the alert for early specimens bearing the cipher of King Edward VIII. Recently the design for new dies for the Neopost machines was passed and plates are in preparation for fitting on to existing machines.

The general features of the King George dies have been retained, but the size of the crown has been reduced and the *E 8 R* cipher introduced. The key letters and meter numbers in the new dies will be rather larger than in the old ones.

Callao Commemoratives

The centenary of the establishment of the Province of Callao has been celebrated in Peru by the issue of a set of 12 commemorative stamps featuring various aspects of the history and life of the Port of Callao and the Province.

We illustrate the 2c. value the design on which gives an excellent picture of the caravel *"San Cristobal,"* which played a prominent part in the battles along the coast at the time Peru was fighting for its independence from Spanish dominion.

The remaining designs are as follows: 4c., La Punta Naval College; 5c., Plaza de la Independencia; Callao; 10c., aerial view of Callao; 15c., Callao Docks; 20c., a plan of Callao; 35c., the locomotive *"La Callao"*; 50c., portrait of D. Jose de la Mar, the first President of Peru; 1s., the mail-boat *"Sacramento"*; 2s., D. Jose de Velasco; 5s., Fort Maipu. The 10s. is probably the most interesting of the whole series. It shows a plan of the fortifications at Real Felipe, built by the Spaniards in 1770. The borders of the stamp are formed by two old-time cannons mounted on a representation of the battlements of the fort extending across the foot of the stamp. The stamp is one of the most interesting pictorial designs of 1936 and it is unfortunate that at the time of going to press a specimen of the stamp was not available for illustration on this page.

Colonial King Edward Stamps

The Crown Agents for the Colonies announce that all Colonies will issue new stamps, bearing a portrait of King Edward VIII, about the date of the Coronation in May next. The stamps will be of standard size with a design showing a three-quarter profile vignette of the King's head in a circle, placed toward the top left-hand corner of the stamp, with the Imperial Crown at the top right-hand corner. The name of the Colony will appear beneath the vignette. The duty tablet will be placed in the bottom right-hand corner, and the denomination will be inscribed in words across the base.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations on this page have been made.

ITALY

1st July, 1936. Set of 5 fine pictorials commemorating the birth of the poet Horace, showing Athlete, the Capitol, Medallion, etc. The set of picked used copies, **10d.**

CAYMAN ISLANDS

Set of 3 unused K.G. pictorials, showing Map, Cat Boat, and Booby Birds, free to genuine applicants for approvals enclosing 2d. postage. Three stamps that are worth having.

CANADA

A fine used set of 50, various issues, including Ottawa Conference, Jubilees, Confederation, 1932 Provisional, Cartier commemorative, coil stamps, etc. A splendid lot, **2/–**.

R. D. HARRISON - ROYDON - WARE

SIX EDWARD VIII NEW ISSUES FREE

Set of six different Mint King Edward stamps from Morocco Agencies, Spanish Zone, French Zone, Tangier, free.

This superb gift will make a really fine start for your Edward collection.

Write to-day, just request approvals and enclose 2d. for postage.

K. HUMPHRIES (Dept. M.N.),
E. Wittering Road, E. Wittering, Chichester, Sussex.

CHEAP APPROVALS

My beautiful Approval Selections are ideal for filling those vacant spaces. Pictorials, Colonials, and hard to get items. Selections from 4 a 1d. Free Gift Bi-coloured Persia all applicants.

A. V. TAPP,

108, CHESTERFIELD RD., BRISTOL

MINT PICTORIALS

(Postage Extra)

5 Egypt Airs ...	7d.	3 △ Liberia Airs	6d.
6 Bermuda ½d.–3d.	1/5	4 △ Mozambique	6d.
9 Bermuda ½d.–1/6	5/–	3 China	8d.
4 Gibraltar 1d.–3d.	1/–	2 Vimy Ridge ...	2/–
5 Ascension ...	1/–	6 Mongolia ...	9d.

Packet of **40 BRITISH COLONIALS 6d.**

A. LUCAS, 60, PARK STREET, BRISTOL.

SPECIAL CHRISTMAS OFFERS

25 Abyssinia, all pictorials, animals, birds, etc.... 3/6
13 Liberia, 1908, elephants, monkeys, birds, lizards, etc. A very rare set 3/6
3 North Borneo, 1888, fine large stamps. Cat. 4/– 1/2
8 North Borneo, 1889, the scarce used set. Cat. 5/5 1/3
17 Persia, 1915 Coronation, wonderful set, stamps having silver frames 1/9
9 Nyassa, 1924 Triangular set 1/7½
25 different Silver Jubilee, includes many scarce 2/6
1,000 different, All the World, wonderful value 3/6

Free Price List of Jubilees, Pictorial and Commemorative at bargain prices on application. **WRITE TO-DAY!** This month to all genuine applicants for my Approvals I am presenting a free set of Colonial Stamps priced at over 5/–.

DERRICK PARKEN,
GREENWITH, PERRANWELL, TRURO, CORNWALL.

"WORTH WHILE"

Your Christmas Present—5/- for 2/-

100 Superior BRITISH COLONIALS, 2/– Post Free. JUBILEES, COMMEMORATIVES, PICTORIALS, etc.

I usually sell this packet for 5/– which contains such good stamps as

New Zealand **JUBILEE 1d.**, 2½as. Indian **JUBILEE**, Nigeria 3d., Australia sheep, Bridge and Sturt Comms., Iraq, Feisal, Gold Coast ½d. to 3d., Western Australia Swan, Mauritius, Palestine, etc.

100 such Colonials for 2/–. Truly a gift.

MONEY BACK IF NOT SATISFIED.

Ask to see some **"WORTH WHILE"** Approval Sheets. **"WORTH WHILE"** sheets for stamps **WORTH WHILE**

JOS. H. GAZE,
21, ATWOOD ROAD, DIDSBURY, MANCHESTER.

SEND FOR OUR

"ZOOLOGICAL" PACKET

Containing a selection of 45 Foreign and British Colonial Stamps, much better than those usually found in packets of this class, including the following pictorials: **Kenya** (Cranes), **South Africa** (Springbok), **Tchad** (Panther), **Turkey** (Wolf), **Poland** (Eagle), **Madagascar** (Zebus), **Cameroons** (Cattle), **Australia** (Sheep), **Hungary** (Turul) also (Eagle), **Fr. Indo-China** (Ox), **Barbados** (Sea-Horses), **Finland** (Lion), **Epirus** (Eagle), **W. Australia** (Swan), **New Zealand** (Kiwi) also (Fantail), **Mauritania** (Oxen), **Fed. Malay States** (Tiger), **Sweden** (Lion). **Price 6d.** Ask for approval sheets and receive **Andorra** pictorials **Free.**

BRETT & CO.,
201, Uxbridge Road, West Ealing, London, W.13.

FREE. 40 Zoological Stamps to applicants for our superior Approvals. Good discount and bonus.—M. Riley, 10, Stricklands Road, Stowmarket, Suffolk.

CHOOSE YOUR OWN FREE GIFTS!

Write now for my List of over **100 DIFFERENT FREE GIFTS** and see how you can add these fine stamps to your collection. To all genuine applicants for my **MODERN APPROVALS** I will present free **A GRAND PACKET OF 26 DIFFERENT BRITISH COLONIALS** including the beautiful **MINT CAYMAN IS. 1935 PICTORIAL** (Cat Boat) and soon to be obsolete. **KING GEORGE ISSUES,** etc., etc. **TO FIRST 250 APPLICANTS** I will also send Free the **MINT PAPUA COMMEMORATIVE** illustrated. Send 2d. postage, etc. (6d. Abroad).

CAMPBELL (M), 71, MANOR RD., TANKERTON, KENT

XMAS BUMPER GIFT—FREE

LAST MINUTE SENSATION—KING EDWARD VIII Colonial included

A luxury Xmas present from **GLOBE-TROTTER** for every stamp collecting reader of "Meccano Magazine" who sends 2d. postage, requesting approvals. A packet of beautiful stamps—a feast to delight the lucky recipient, including Historic **PICKARD BALLOON STAMP,** illustrating Pickard's stratosphere exploring balloon, **Mozambique** and **Roumanian Air Mails,** Pictorials from **Belgian Congo** (Native Huts), **Trinidad, British Guiana** (Native), **Silver Jubilee,** two mint **Belgian** 1919 (**Tin Hat**) stamps, **Equador** (Map), large **Persia, Syria** (Mosques), **Palestine, Kenya** (Mint), selection of **Six striking African pictorials,** and others. Act now—write for your free gift now—remember **GLOBE-TROTTER** approval selections are famous for sensational value. Ask for particulars of **FREE** stamps every 14 days!

GLOBE-TROTTER, 17, WINCHESTER ROAD, BIRCHFIELD, BIRMINGHAM.

AN AMAZING XMAS OFFER

Our final **FREE GIFT** for 1936 is definitely the **BIGGEST** and **BEST** we have ever presented. We have been able to include the latest new issue from the **MOROCCO AGENCIES** (King Edward VIII), together with a large assortment of superb **PICTORIALS** including **ST. LUCIA, NIGERIA, BRITISH GUIANA, NEWFOUNDLAND, ALGERIA** (set of three), **IRAN, TANGANYIKA** and **GERMANY,** and many attractive items such as **PERAK,** Siam, Mozambique, and Jugo-Slavia. **FREE** and **POST FREE,** just a P.C. requesting approvals to:

THE UNIVERSITY STAMP CO., 1, PLANTATION ROAD, OXFORD

The ST. KITTS Packet

Contains a **Fine mint ST. KITTS-NEVIS 'War Stamp' pictorial;** Large **AIR MAIL** Pictorials from **INDO-CHINA; U.S.A.** and **CHILE; Windsor Castle JUBILEE Pictorials** from **CEYLON, TANGANYIKA** and **JAMAICA;** Large **VATICAN STATE Pictorial** Commem.; **Obsolete ABYSSINIAN** Pictorial; a Liberian **TRIANGULAR Air Mail** Commem.; Large **BR. NYASALAND** Pictorial; China **Sun Yat Sen; Canada JUBILEE (Princess Elizabeth).** Also the **Beautiful QUEEN ASTRID Mourning** stamp. 1/– only (Postage 1½d. extra). Purchasers asking for our **BARGAIN** appros. will receive a **LARGE SPANISH TRIANGULAR** Commem. **FREE!**

THE PUKKA STAMP CO., 27, NORMANDY AVENUE, BARNET.

IMPROVED

THE "MYSTIC" PACKET

1000 UNKNOWN UNUSUAL UNSORTED 1/6

(Over 200 diff. guaranteed.)

Stamps on paper, etc. Just as received from Convents, Missions, Banks, etc. Guaranteed unpicked. Chance of a **FIND** in every lot. Send to-day for your treasure hunt to-morrow. 3 for **4/3**, 6 for **8/–. Abroad 1/9** pkt. **FREE!** 25 Br. Cols. including the new reign issues to approval applicants. Enclose postage. Overseas 3d. Also **FREE EXCHANGE.**

ASTLEY & CO.
(M), LOWHILL, WOLVERHAMPTON

FREE! EXHIBITION PACKET

containing 50 different stamps including **Antwerp 1894 Exhibition, Brussels 1896 Exhibition, Schlesvig Plebiscit, Russia,** set of **Austria** (all mint), Canada, Chili, Jamaica, etc., together with 250 mounts, handy duplicate book, and perforation gauge. Request approvals which contain the new **Edward VIII** Morocco Agencies Stamps. 25% discount. Enclose 2d. postage. Beginner's outfit containing 80-page Album, 100 different stamps, swap pocket case, 500 mounts, Tweezers, duplicate book, and magnifying glass, 2/8.

A. R. Dickie (Dept. M), 23, Winscombe Cres., Ealing, W.5

FREE SETS of STAMPS

6 Cuba or 6 Imperial China or 6 Straits Settlements or 6 old French, etc. Just send stamps value 2d. and ask for my Approval Sheets containing some high value stamps at low prices and with progressive discounts. State which set of stamps desired to be sent free.

P. ILLINGWORTH,
TRANMERE PARK, GUISELEY, near LEEDS.

10/- Loose-Leaf Stamp Album, Morocco-grained Cloth Cover, 100 Ruled Sheets and 1,000 Stamps, all different. Post Paid. **Auntie Dot, 244, Fawcett Rd. Portsmouth.**

600 BRITISH COLONIALS on approval. Pick at ½d. each.—Sanders, 90, Newlands Avenue, Southampton.

C. V. Fairweather for approvals; British Colonials a speciality.—70, Betchworth Rd., Seven Kings, Essex.

ZOO

PACKET (USUAL PRICE 1/-) **FREE**

to all genuine applicants for approvals sending 3d. to cover postage (both ways). Illustrated list of albums and accessories free.

C. Fawcett, 36, Flaxley Rd., Selby

Clearance Sale of Stamps

A large stock irrespective of catalogue value has been made up into packets. Mint and used Pictorials, Commemoratives, Air Mails, Jubilees, etc., etc., are included in these wonder packets. Never again will such value be offered. Post free, cash with order. 250 for **1/6.** 500 for **2/6.** 1,000 for **4/6.**

R. F. Farrington, 61, Penge Rd., London, S.E.25

Approvals: ½d.—3d. Postcard brings good selection. B. Purcell, 59, Highbridge Road, Aylesbury.

100 diff. Stamps Free to approval applicants, good discount.—Gosling, 21, Powling Road, Ipswich.

Free. 5 Iraq and Nigerian Pictorials with approvals. Postage 1½d.—G. Kingsmill, New Barnet, Herts.

GOOD SELECTION ¼d. and ½d. approvals. Generous discount.—Mann, 206, Abbey Road, Kirkstall, Leeds, 5.

APPROVALS—Better class only—competitive prices —no gifts.—Edward Lord, Grafton Road, Keighley.

100 Different Stamps Free to Approval applicants. Liberal discount.—Cuthbert, Newsham Lane, Broughton, Preston.

WHEN WRITING TO ADVERTISERS

Readers are urged to observe the following points when writing to advertisers:

1. **Mention the "M.M." and any special reference number quoted in the advertisement. This helps the advertisers to give prompt attention.**
2. **See that the full amount of the price and any postage is included. It is unfair to expect advertisers to fulfil their undertakings promptly if short remittances are sent.**
3. **Give your full address.**
4. **Enquiries concerning advertisements or advertisers should be addressed to:**

THE ADVERTISEMENT MANAGER
MECCANO MAGAZINE, Binns Road, LIVERPOOL 13

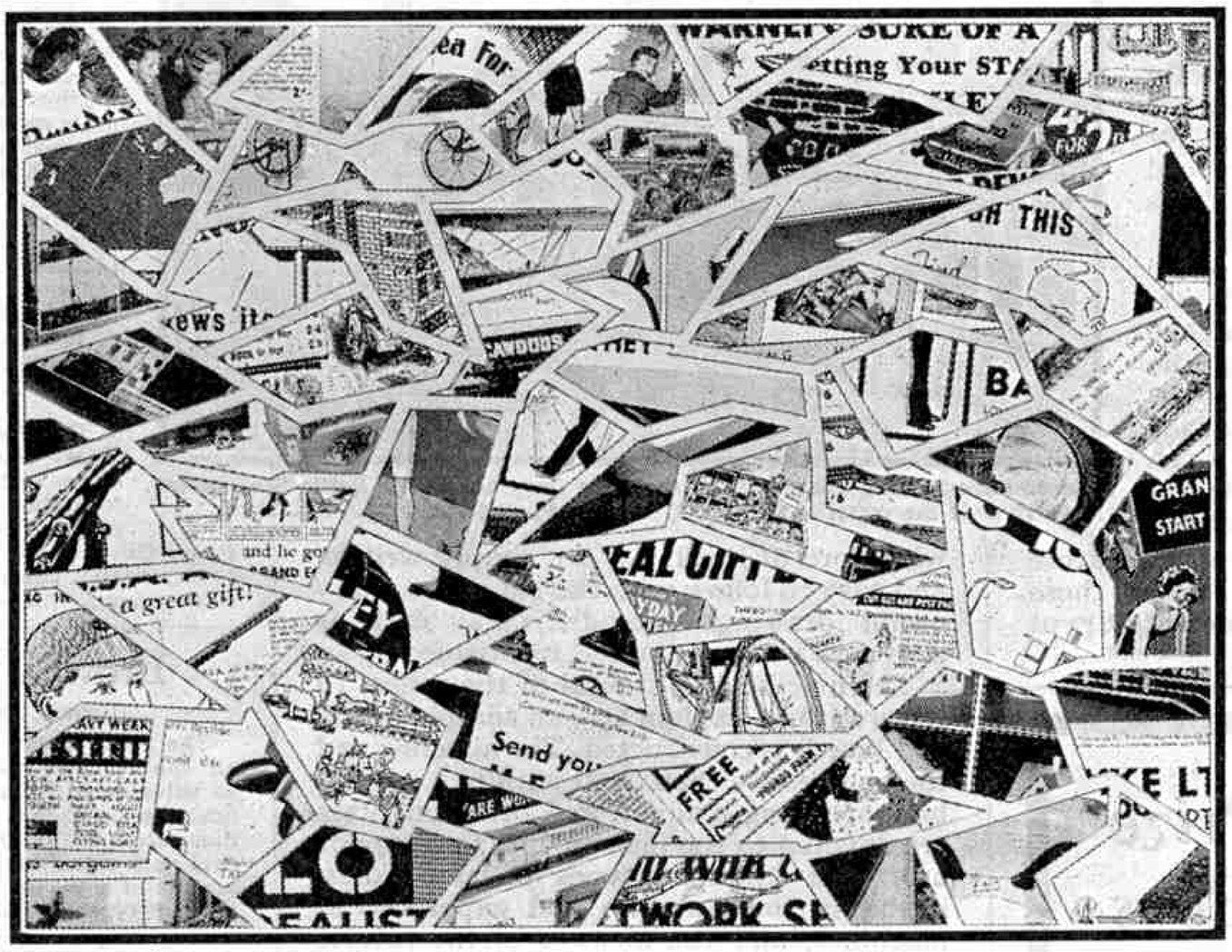
See also other stamp advertisements on pages 742 and 744

Competition Corner

ADVERTISEMENT "JIG-SAW" CONTEST

The advertisements in this month's "*M.M.*" will be almost as important to most of our readers as are the Editorial pages. Christmas presents will be selected this month and the advertisement pages display a host of interesting toys, games and novelties calculated to gladden the heart of any boy.

In repeating the "Advertisement 'Jig-Saw' Contest" that has proved so very popular in recent December numbers, we feel sure that our readers will find the problem of sorting out the advertisements represented in the accompanying picture a most amusing occupation, and it will be a profitable one for those who are successful in winning prizes.



The illustration consists of fragments that have been cut from advertisements appearing in this issue of the "*M.M.*," and our readers are invited to discover the advertisements from which the fragments have been taken. Some of the pieces will be readily traceable, but others will prove not quite so easy. We hope indeed that they will tease our lynx-eyed readers more than a little, for it is a very long time since we succeeded in setting a puzzle that could not be solved by more than a few of our readers!

In their solutions competitors must give the names of the advertisers concerned, and it should be noted that when an advertiser has more than one advertisement in this issue, the number of the page from which the fragment is taken must be stated in the entry.

Prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the senders of the four most accurate lists in order of merit. In addition there will be a number of consolation prizes.

Entries for the competition must be addressed to "Jig-Saw Advertisement Contest," Meccano Magazine, Binns Road, Liverpool 13, and must be forwarded to reach this office not later than 19th December. The winners will be advised by post on 21st December and their prizes will be despatched to arrive on Christmas Day.

Another set of prizes, of the same value and to be awarded in similar conditions, will be allotted to the Overseas section, which is reserved for entries from readers living outside Great Britain, Northern Ireland, the Irish Free State and the Channel Islands. Entries for the Overseas Section should be mailed to arrive not later than 31st March, 1937.

Christmas Shopping Contest

Eleven years ago we held a contest in which readers were asked to imagine that they had been given £10 to spend on Christmas presents for themselves. The entries in this contest were very interesting and we should very much like to know if there has been any change since 1925 in our readers' ideas of what they would do with such a sum. This month, therefore, we are arranging a similar contest.

We want every reader to imagine that he has been given a £10 note and told to buy for himself the Christmas present he would like most of all. The money must be spent amongst advertisers in the December "*M.M.*," but Meccano products must not be included in the list of purchases. Readers may buy as many articles as they wish provided that the whole sum is spent, and brief notes should be added to explain their reason for each purchase.

There will be two sections in this contest—Home and Overseas—and in each prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– will be awarded.

Entries should be addressed "Christmas Shopping List, Meccano Magazine, Binns Road, Liverpool 13," and must be sent to reach this office not later than 31st December. Overseas closing date, 31st March, 1937.

December Drawing Contest

This month we announce the third of the monthly drawing and painting competitions that we are holding throughout the winter. Competitors may select any subject they like for their entries in this contest, and full details of the conditions and the prizes offered were given on page 607 of our October issue. New readers who are unable to obtain copies of the October issue can obtain full details from the Editor.

Entries in this month's competition must be addressed "December Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date is 31st December. Overseas section 31st March, 1937.

COMPETITION RESULTS

October Crossword Puzzle.—A large number of readers succeeded in submitting an all-correct solution to this contest, and in making their awards the judges were compelled to take into account the neatness and novelty of presentation of these entries. The solution will appear in the February issue.

The awards were as follows: 1. J. A. RYDE (Carshalton). 2. E. BURNS (Wembley Hill). 3. H. MCLACHLAN (Edinburgh 10). 4. N. F. BARTRUM (Warminster). Consolation Prizes: B. HARDIE (Bristol, 9); G. H. MARSH (Tipton); R. RICHARDS (London, E.5); A. RUSSELL (Harrow); R. P. and J. C. WALFORD (Newton Abbott).

October Drawing Contest.—First Prizes: Section A, D. V. GIBBS (Dundee); Section B, J. S. TAYLOR (Burnley). Second Prizes: Section A, A. MARSH (Coventry); Section B, J. LAING (Bramley). Consolation Prizes: A. R. EVES (Boston); A. GILLIARD (Stroud); W. D. HALL (London, N.12); W. R. PHILLIPS (North Thoresby); J. P. TYRRELL (Teddington).

OVERSEAS

July Photo Contest.—First Prizes: Section A, L. W. HUMM (Geraldine, N.Z.); Section B, K. HARRIS (Kowloon, Hong Kong). Second Prizes: Section A, H. BENNETT (Auckland, S.W.2); Section B, M. V. NATHAN (Conjeevaram).

July Sketchograms.—First Prizes: Section A, J. R. DINGLE (Halifax, N.S., Canada); Section B, R. TORRE (Buenos Aires). Second Prizes: Section A, S. D. KURLAWALLA (Bombay); R. L. LAWSON (Cape Province, S.A.).

News for the World of 8113 A.D.

What will the world be like in the year 8113 A.D.? That we cannot know, but a scheme has been set on foot in America to store records and articles that will give the people of that far distant time a complete picture of our civilisation. It is proposed to place these in a stainless steel vault in the basement of Oglethorpe University, Georgia, and the year 8113 has been chosen for the opening of the vault because it is as far in the future as the first authentic date in history is in the past. If the vault survives the ravages of the 6177 years it is intended to last, the future inhabitants of the world will find in it books and newspapers, photographs, models of machinery, gramophones and cinematograph films that will show them exactly how we live to-day. The vault has an excellent chance of survival, for the buildings in which it is placed are fireproof and their foundations are on solid granite bed rock.

Earthquake, famine, or some other form of disaster may devastate the country round about the vault, or may even destroy the greater part of the Earth's population, so it may be left to a race practically undreamed of to open it, if they know of its existence, or to discover it by excavation. No doubt the archæologists of the future then would gloat over it as do those of to-day over finds in ancient Egypt or Mesopotamia.

The £300 Prize Novel for Boys

Col. JOHN MACKWORTH'S

The Menace of the Terribore

The story of a vast tank-like burrowing machine which attacks the vaults of the Bank of England. 5/- net.

From all booksellers

HARRAP

MORE BOOKS TO READ

(*Continued from page 719*)

"Aeroplanes"; "The Modern Ship"; "Railways"

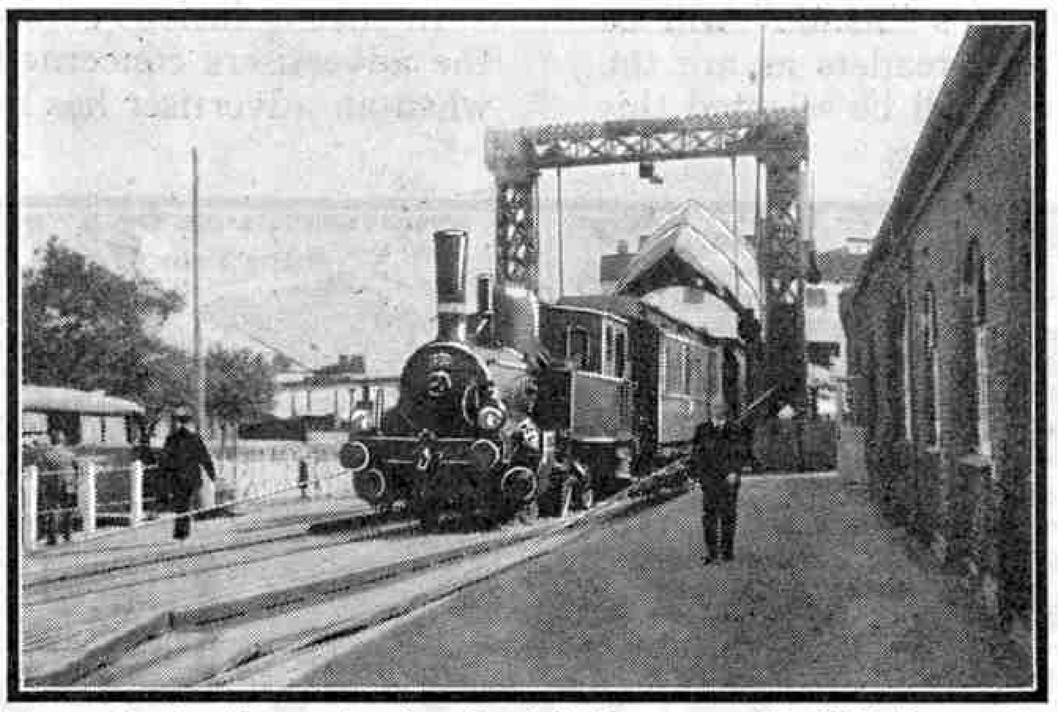
By R. Barnard Way and N. D. Green
(Wells, Gardner. Each 3/6 net)

These three books are the first of "The Modern How-it-Works Series," the object of which is to explain the mysteries of modern science and engineering to those who are not experts, yet wish to know the why and wherefore of it all. All are simply written and easy to follow with the aid of the many useful drawings provided, and each is provided with a coloured frontispiece.

The first book is typical of the series. In it the authors explain how an aeroplane flies and how it is constructed. The airscrew and the engines are then dealt with in a general but satisfying manner, and other chapters are devoted to the instruments that a pilot uses, the different types of aeroplanes, including the Autogiro and experimental machines, and the airways of the future.

The volume on the modern ship also covers a wide range, from the design and building of a ship to its operation at sea. Tankers, dredgers, submarines, train ferries and other special types of vessel are dealt with in addition to liners and cargo boats, and there are sections on the control of ships, instruments, and anti-rolling devices.

Railways are equally well described in the third volume, which is packed full of interesting information. It begins with an account of the work of building a railway, from the engineer's survey to the laying of the track, and passes on to the construction of the permanent way. The safety of railway working is next considered in a chapter devoted to signalling, and the authors then turn to the locomotive and rolling stock. The volume ends with an account of electrical railway equipment.



A locomotive hauling coaches from the train ferry across the Baltic Sea on the arrival of the vessel at Gjedser, Denmark. Photograph by J. M. S. Risk.

Adventure Stories

(R.T.S.)

"*Companions of the Bush,*" by H. Allen Beard (2/- net) relates the exciting adventures of an English boy and his two Australian friends, who show their worth in many strange and difficult situations. In one particularly thrilling episode they join in the chase and capture of a bush-ranger. Throughout the action is swift and the story entertaining.

Charles Kingsley's masterpiece, "*Westward Ho!*", is still a favourite with boys, and is here reprinted in convenient form (2/6 net), with a coloured frontispiece, and numerous pen and ink sketches in the text.

Charles Letts's Diaries for 1936

Letts's ever-popular "*Schoolboy's Diary*" for 1937 shows an interesting change. It has been revised to make it suitable for boys up to 14 years of age, and a new edition, with the name "*The Public Schools Diary,*" has been introduced for older boys, students and university undergraduates.

In addition to the usual diary portion "*The Schoolboy's Diary*" contains an excellent atlas and nearly 60 pages of text, in which valuable information is given about professions and qualifying examinations, school sports records, and language helps and arithmetical tables. The diary is published in cloth at 1/-, and can be obtained also in leather cloth, with pencil and maps, at 1/6, and in leather with pencil, maps and pockets at 2/6.

"*The Public Schools Diary*" gives valuable information on similar subjects of a more advanced character, together with notes on motor law and driving tests, and there is also an excellent sectional atlas of the British Isles. The diary is published in leather cloth, with pencil and maps, at 1/6, and in leather, with pockets, pencil and maps at 3/-.

Charles Letts's "*Wireless Diary*" is an excellent little publication, the diary portion of which is supplemented by 75 pages of text. These pages include a list of the chief long, medium and short wave stations, useful hints on the maintenance and repair of wireless receivers, and a section on television. This diary is obtainable in cloth at 1/-, and in leather, with pencil, at 2/6. The pages of the "*Motor Cycling*" Diary have provision for keeping daily mileage records, and the text includes notes on road law, licences and taxation, and a very useful first aid section. Other features are a distance table and a list of famous British hills, with their location, gradient and length. The diary is published in cloth at 1/-, and in leather, with pencil, at 2/6.

The diary pages of Letts's "*Boy Scouts' Diary*" contain excellent nature notes, and other sections are packed with useful information on signalling, ropes and knots, first aid, and other subjects of interest to Scouts, Rover Scouts and Wolf Cubs. It is published in art cover, without pencil, at 9d.; with pencil, at 1/-, and in leather case, with pockets, at 2/6.

Brown's Boy Scout Diary

(Brown, Son and Ferguson Ltd. 1/-)

The 1937 issue of this excellent diary contains all the features that have made previous editions so valuable to Scouts. There are details of the qualifications of each type and class of Scout, and an illustrated list of proficiency badges. Other sections deal with signalling, camping and first aid, and there are useful notes for Sea Scouts, together with illustrations of types of sailing ships.

Minibrix Model-Building Competition

Competition enthusiasts among our readers will find an interesting opportunity to try their skill in the Minibrix Model-Building Competitions, brief details of which are given in our advertisement pages. Two competitions are to be held, a winter one to close on 1st March and a summer one to close on 1st June, and prize money to the value of £100 is offered for the best models constructed throughout with Minibrix.

Full details of the competition and an entry form can be obtained from the Minibrix Competition Department, Premo Rubber Co. Ltd., Petersfield, Hants. Readers should mention the "*M.M.*" when writing.

Billiards in the Home

Billiards is one of the most fascinating of indoor games, and the small tables manufactured by E. J. Riley Ltd. make it available for every home, however small. The firm's products include several that can be placed on an ordinary dining table, and others that are both dining and billiards tables. Whatever its size, a Riley model is not a toy, but a perfect replica of the full-size table supplied to all parts of the world.

E. J. Riley Ltd. of Deal Works, Accrington, or Department 3, 147, Aldersgate Street, London, E.C.1, will be glad to send an attractive art list of their billiards tables to any "*M.M.*" reader who is interested.

Skybird Displays

Model aeroplane enthusiasts among our readers will find many displays to interest them in the big stores this Christmastide. Outstanding among these will be the Skybird Aeronautical Model Department that was recently opened at Selfridges, London, by Sir Harry Brittain and Mr. C. W. A. Scott.

The principal feature of this Department is an exhibition of models illustrating aeroplane development from the period of the Great War to modern times. There is also a complete model of the civil airport at Gatwick built entirely with Skybird units. The model includes a representation of the unique Martello Air Station, hangars, and the adjoining S.R. Station.

Fireside Fun

THE QUICKEST WAY

Mrs. Rideout: "What lovely fleecy clouds: I'd like to be up there sitting on one of them."
Mr. Rideout: "All right, you drive the car."

* * * *

Two small London boys were gazing at the window of a butcher's shop decorated for Christmas. Presently one of them pointed to a number of hams hanging from a large holly branch.
"Look, Tom," he said. "Look at them 'ams a-growing up there."
"Get away," said the other. "'Ams don't grow."
"That's all you know about it," said the first scornfully. "Ain't you ever 'eard of a 'am-bush?"

* * * *

A selection of books suitable for Christmas presents: "Murder," by Mustapha Coffin; "How I Swam the Channel," by Francis Neare; "Bad Bargains," by Magot Dunn; "The Poet," by E. Auta B. Shot; "The Speedster," by Will. E. Skidd; "The Crooked Staff," by Harold Bentit; "Spring-heel Jack," by Eros High.

* * * *

A certain young fellow named Bertie
When his boots got all dusty and dertie,
Used to walk in the rain
Till he'd cleaned them again,
But he caught cold and died when aged thertie.

* * * *

A little girl's account of the children who mocked Elisha ended:
"And Elisha said to the children, 'If you make fun of me, I will set my bear on you, and it will eat you all up.' And they did, and he did, and it did."

* * * *

On his return from his first dancing lesson Bobby was asked how he liked it.
He replied: "Aw, it's easy. All you have to do is turn round and keep wiping your feet."

* * * *

"Hello, Jack. What are you doing?"
"I've built a shed out of my own head."
"Out of your own head?"
"Yes, and there's plenty of wood left for a dog-kennel."

* * * *

"I told the doctor about my absent-mindedness."
"What did he say?"
"Asked for his fee in advance."

* * * *

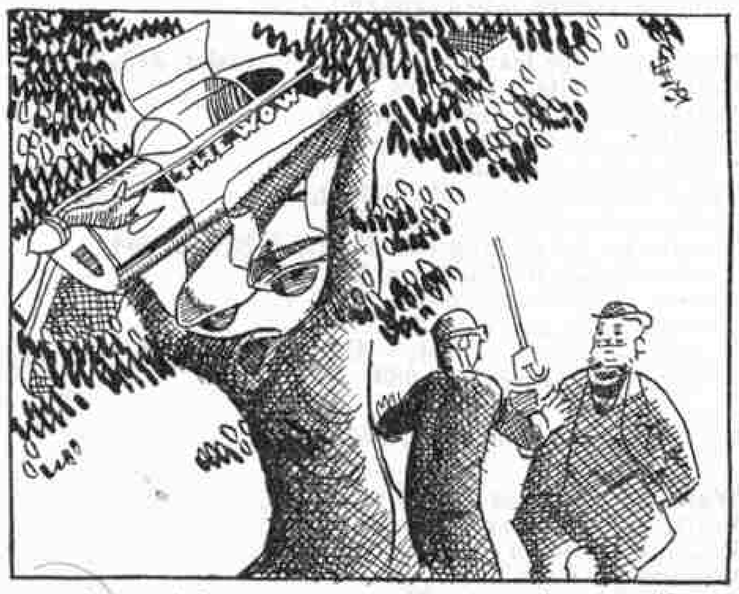
Lieutenant: "The enemy are as thick as peas. What shall we do?"
Captain: "Shell 'em! Shell 'em!"

* * * *

Diner: "This lobster has only one leg!"
Waiter: "Yes, sir. It lost the other in a fight."
Diner: "Well, take this back and bring me the winner."

* * * *

A NEW TRUNK LINE



Airman (after landing in a tree) to farmer: "I was trying to make a new record."
Farmer: "You did. You're the first man to climb down that tree before climbing up it."

OUTLOOK UNPROMISING

First Caddie: "What's your man like, Charlie?"
Second Caddie: "Left-handed, and keeps his change in his right-hand pocket."

* * * *

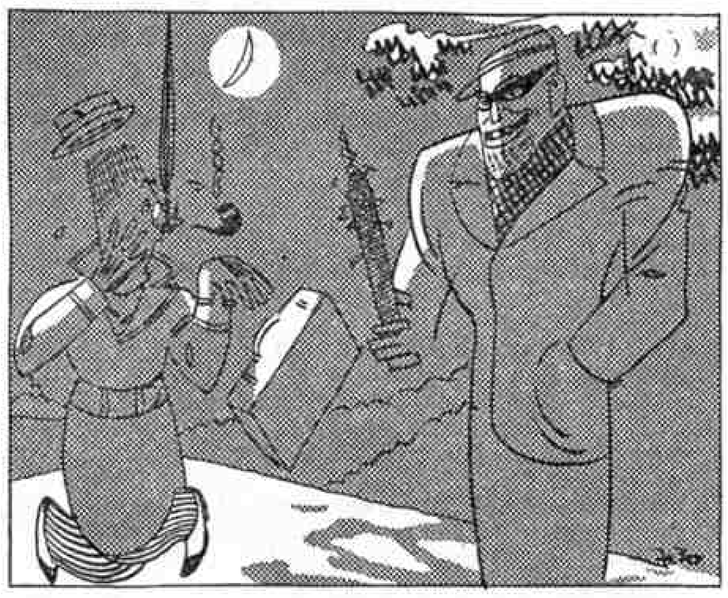
A certain young fellow named Vaughan
Took his dog for a stroll on the laughan,
But the pup, strange to say,
Went the opposite way,
And didn't return till next maughan.

* * * *

Teacher: "You missed class yesterday, didn't you?"
Boy: "Not at all, sir, not at all."

* * * *

FOR LUCK



Footpad: "Seeing as it's a noo moon, 'ow about turning yer money over?"

* * * *

"You say you served in the Great War?" said the restaurant manager, as he sampled the new cook's first soup.
"Ay, sir. Officer's cook for two years an' wounded twice."
"You're lucky. It's a wonder they didn't kill you."

* * * *

Enthusiastic House Agent (displaying catalogue): "This is a house without a flaw."
Prospective Customer: "Gosh! What do you walk on?"

* * * *

"Did you call on Mr. Smith about the bill?"
"I did."
"And what did you find out?"
"Mr. Smith."

* * * *

Outfitter: "Yes, sir, here are the boots for your Polar expedition. By the way, were you satisfied with the boots we supplied you with for your last expedition?"
Explorer: "They were the best boots I ever tasted."

* * * *

Pedestrian (to boy leading skinny pup): "What kind of a dog is that, my boy?"
Boy: "This is a police dog."
Pedestrian: "It doesn't look like a police dog."
Boy: "No, it's in the secret service."

* * * *

Tramp: "Yes lady, I had to give up work because I couldn't make both ends meet."
Lady: "What was your work?"
Tramp: "I was a contortionist."

* * * *

Old Gardener: "This yer ole sundial 'as stood 'ere for fower 'undred years."
Fair Tourist: "You don't say! And does it still keep fairly good time?"

* * * *

Judge (after explaining point of law to prisoner): "Now, what would it be termed if I were to strike you in the street and steal your watch?"
Prisoner (old lag): "Suicide, yer 'onour! Suicide!"

* * * *

Teacher (after reading John's essay on electricity): "I see here a reference to 'elastic current.' What do you mean by that?"
John: "'Elastic current' is the Scotsman's unit of electricity."

EASY MONEY

Willie: "I wish I were the gas."
Father: "Why, Willie?"
Willie: "Because every time it goes out it gets a penny."

* * * *

Young Doctor: "I'm afraid I made a mistake in filling in a death certificate to-day."
Old Doctor: "How was that?"
Young Doctor: "I absent-mindedly signed my name in the space left for 'cause of death'."

* * * *

Printer's error: "At 60 miles an hour the express dashed into the cow and literally cut it into calves."

* * * *

A man went up to a railway porter at an important station and said: "There are half a dozen clocks in this place, and they are every one different."
"Well, sir," said the porter, "if they were all alike, one would do!"

* * * *

The chemist was in a bad temper. He had told his assistant to have a sign painted for the outside of his shop, and on seeing it, was furious.
"You're a fool," he said.
"But the sign is beautifully done," said the other.
"It may be," replied the chemist, "but who is going to trade here when our sign reads: 'In making up prescriptions, we dispense with care'."

* * * *

Two tramps found a bottle of wine and retired to a secluded spot to make the best of their good fortune. By the time the bottle was empty both were fit for anything.
"Bill," said one. "I'm going to buy the Johannesburg goldfields."
"But, my dear fellow," replied Bill, with a patronising wave of his arm, "I don't care to sell."

* * * *

Angry editor to reporter: "What do you mean by inserting the expression 'Apple sauce' in parenthesis in my speech?"
Reporter: "Apple sauce? Great Scot, man, I wrote 'Applause'."

* * * *

Humble Guest: "Er—have you ever walked in your sleep, sir?"
Rich Man: "Certainly not. I may have motored."

* * * *

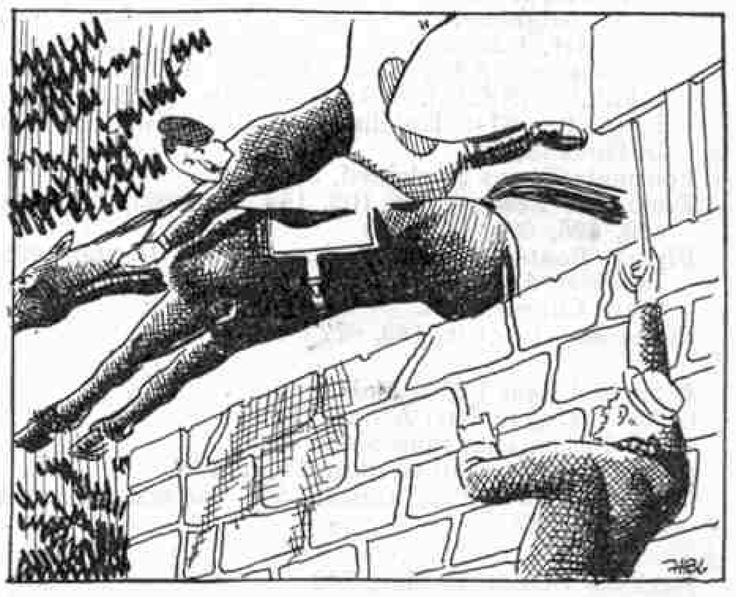
Some men were at work in a large cable pit when an inspector shouted down, "How many of you are there down below?"
"Five," came the answer.
"Well, I want half of you here to give a hand right away!"

* * * *

Teacher: "'I have went.' Is that sentence wrong, Johnny?"
Johnny: "Yes, Ma'am."
Teacher: "Why is it wrong?"
Johnny: "Because you ain't went yet."

* * * *

NOT HIS FAULT



Irate Landowner: "Hi! Can't you see that sign 'Private Property'? Why don't you keep off?"
Horseman (hanging on to runaway horse for dear life): "Don't tell me, tell the horse!"

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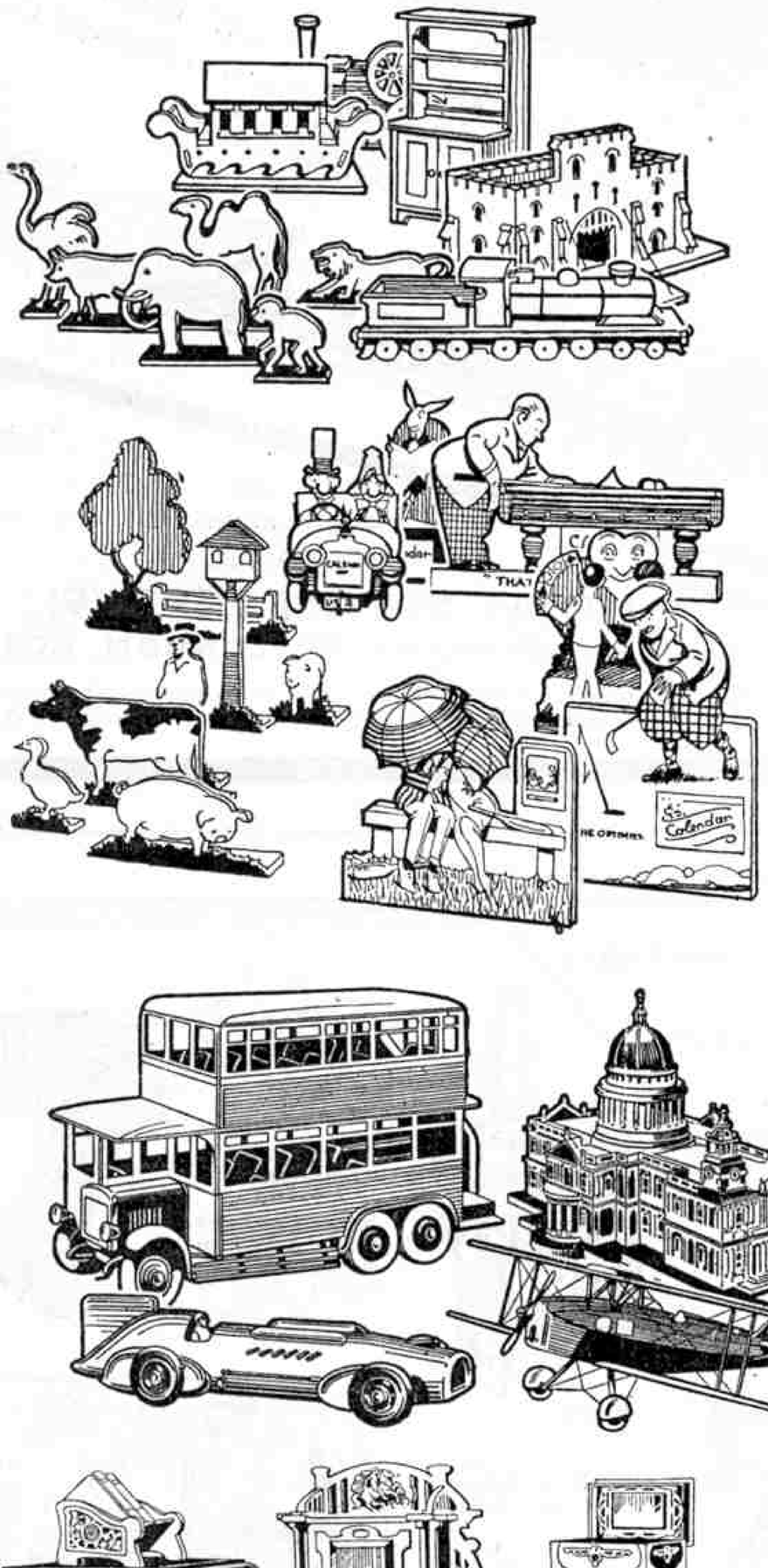

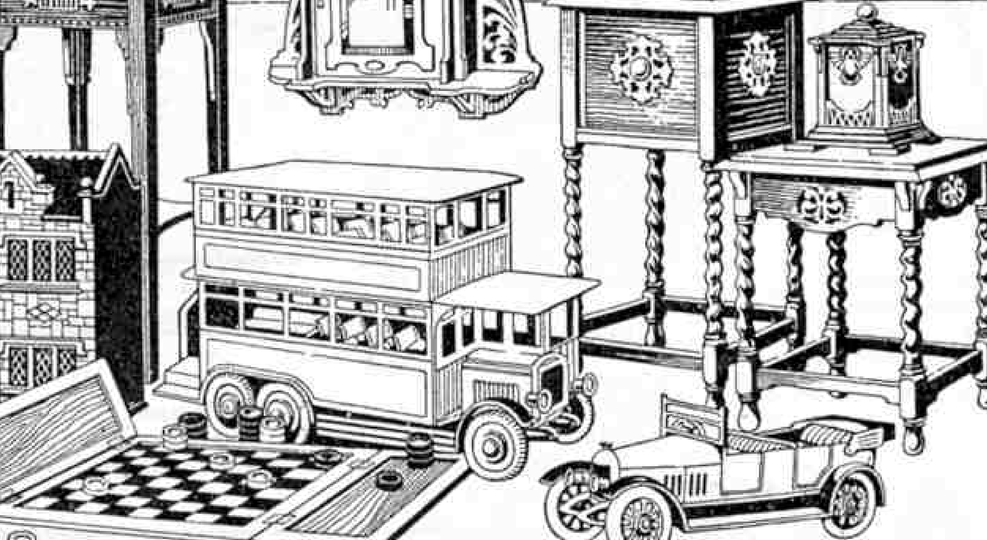

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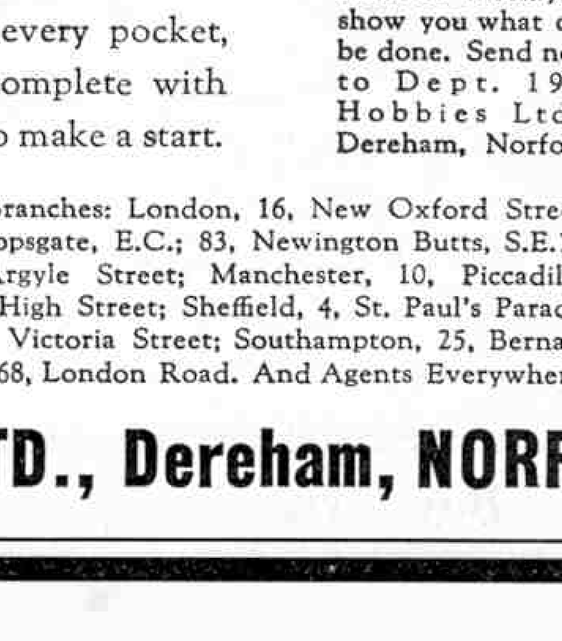

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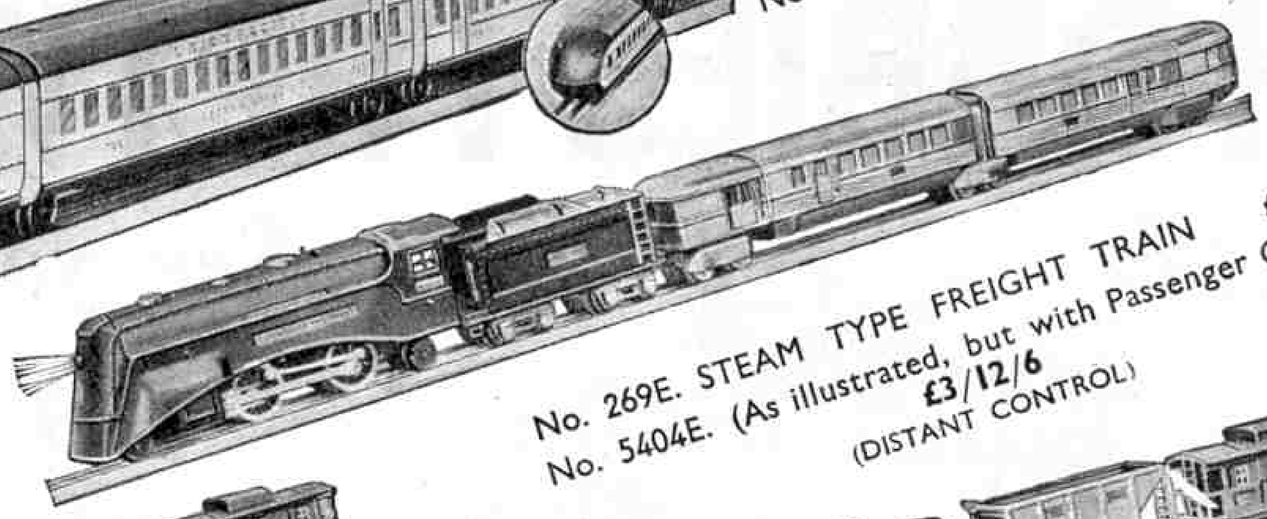

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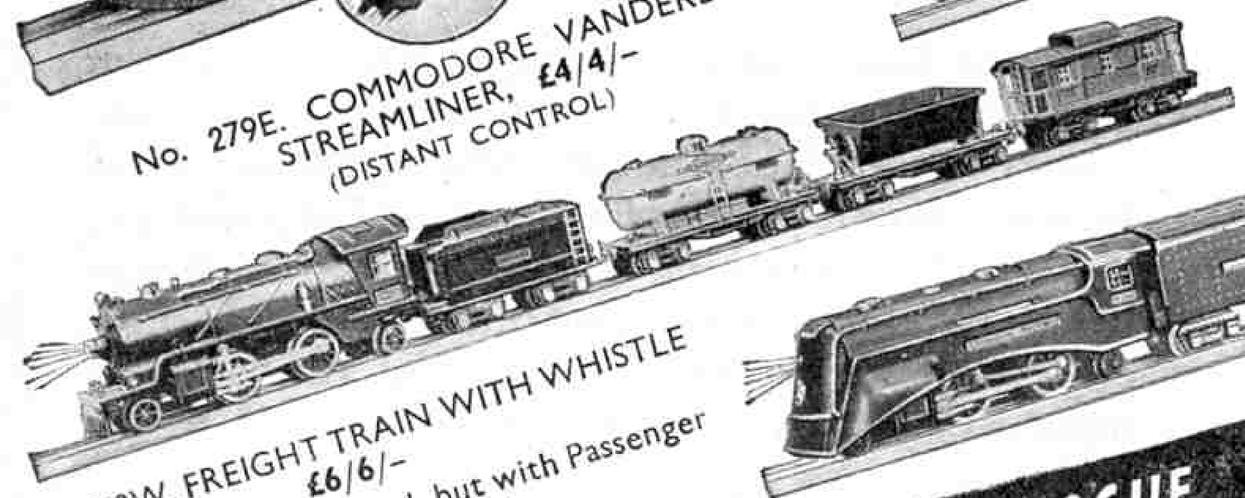

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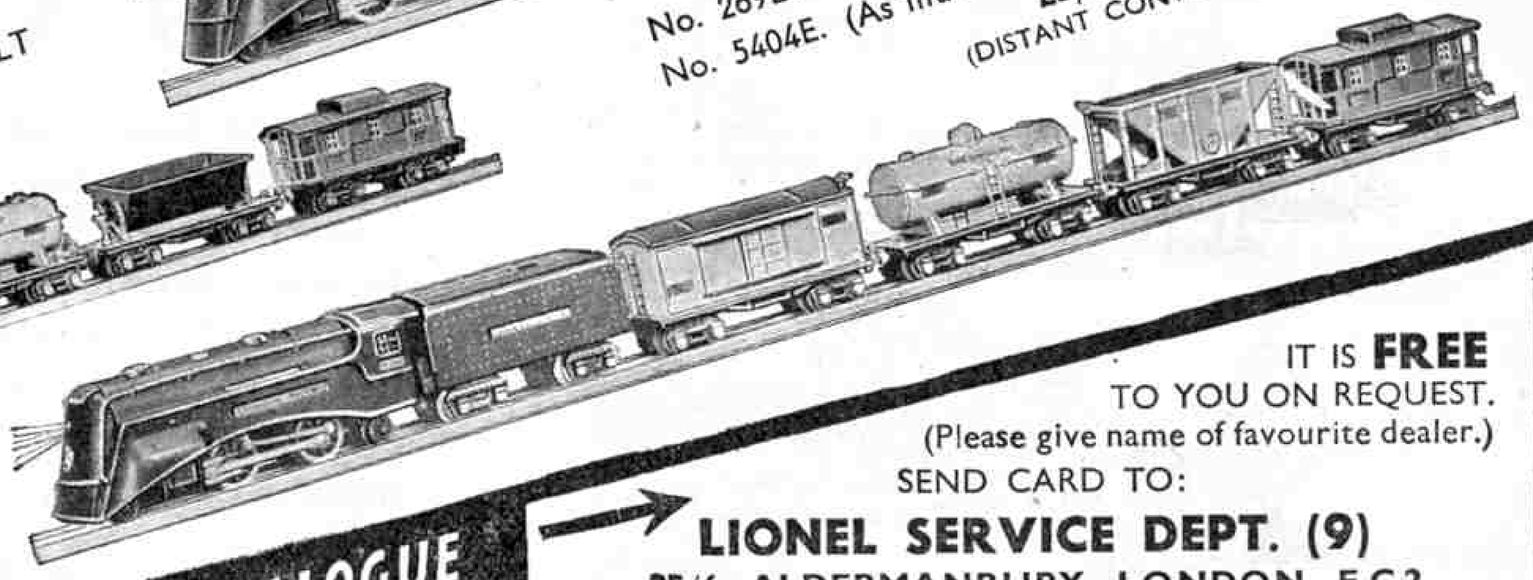

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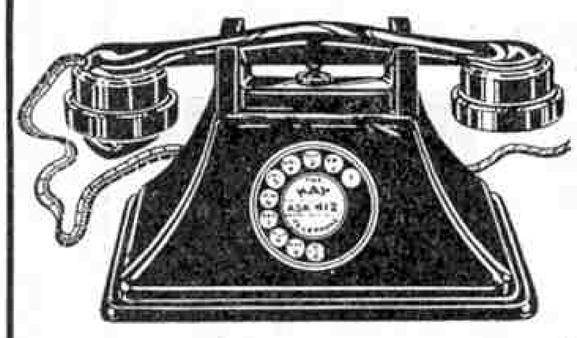

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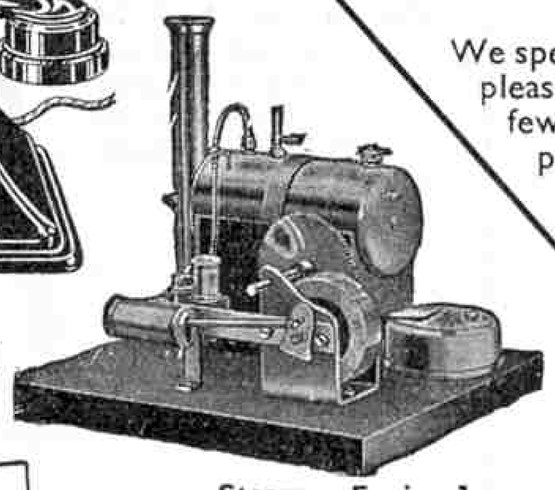

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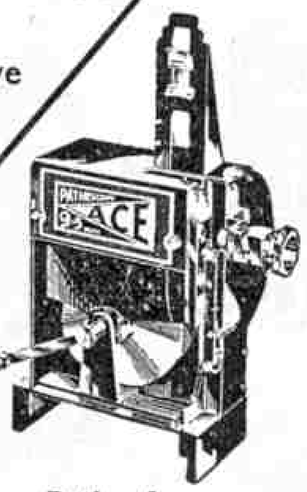

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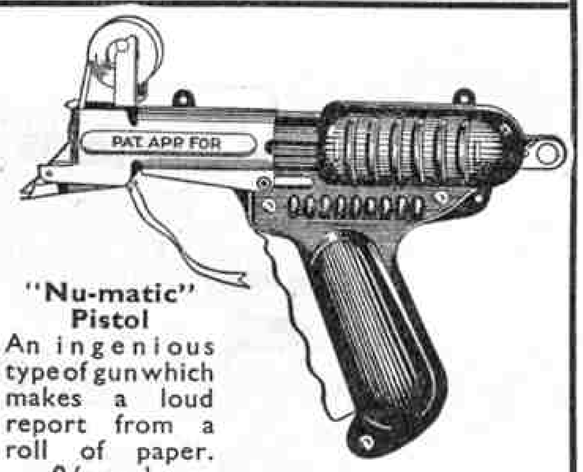

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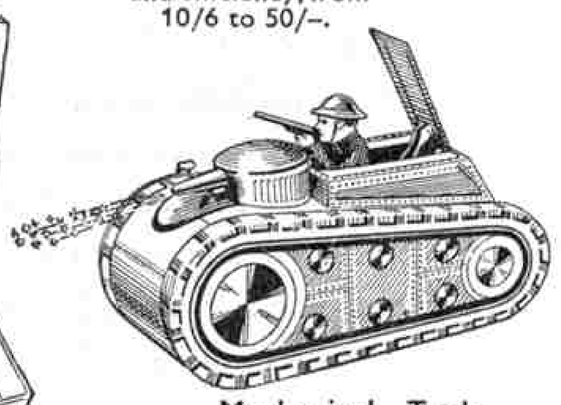

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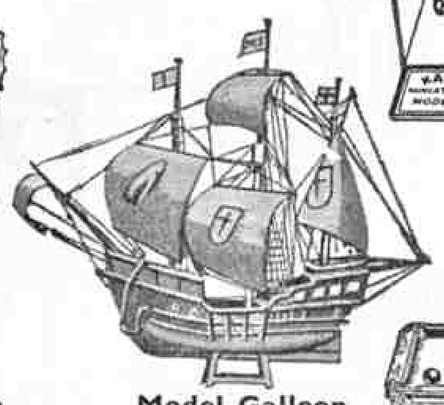

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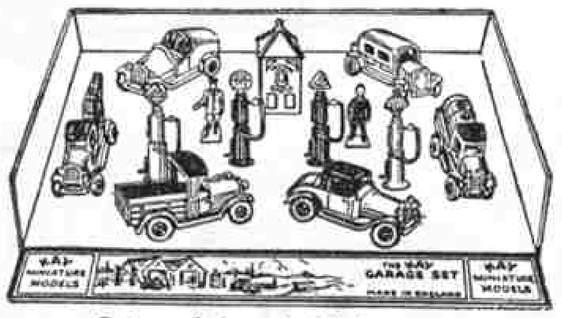

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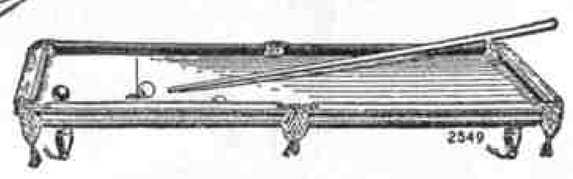

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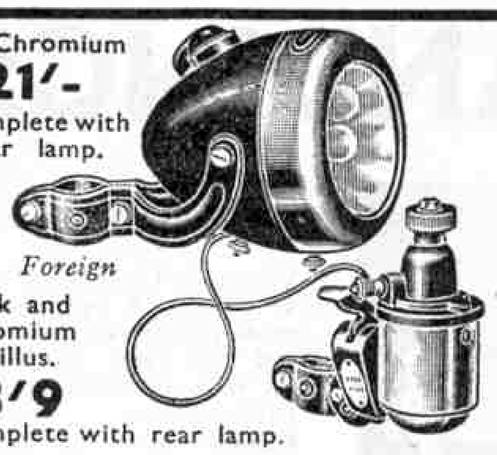

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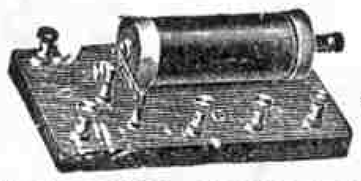

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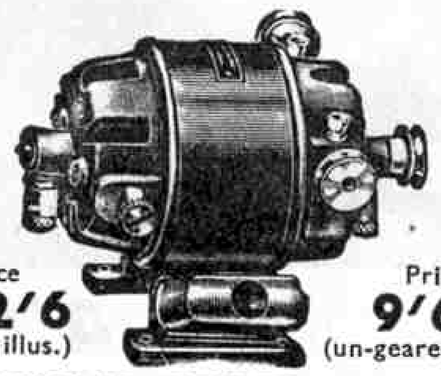

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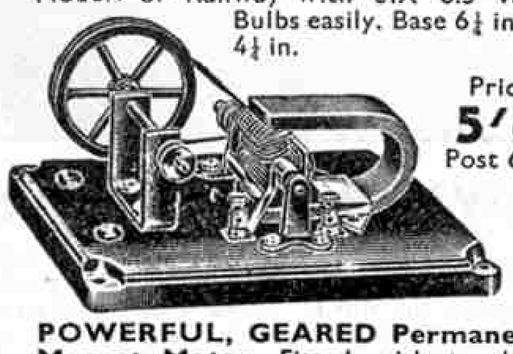

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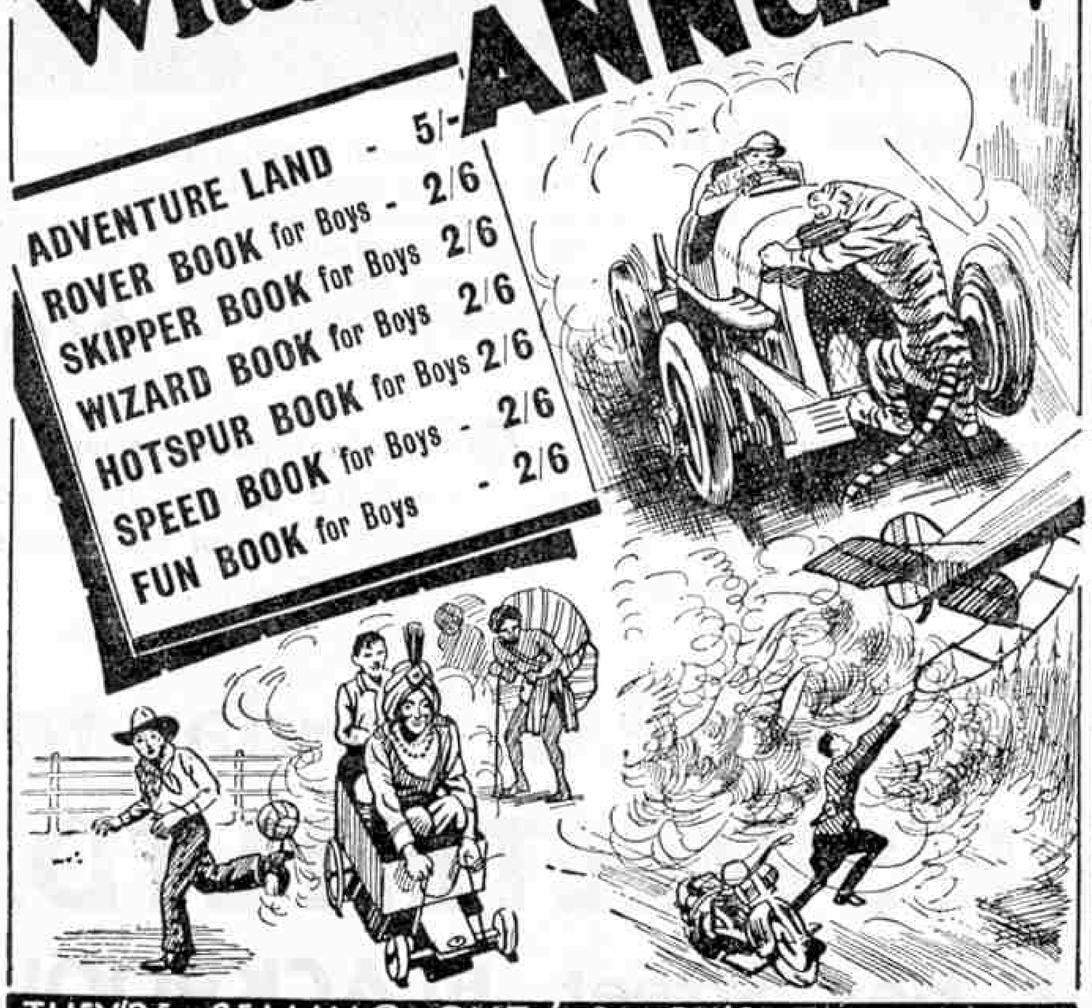

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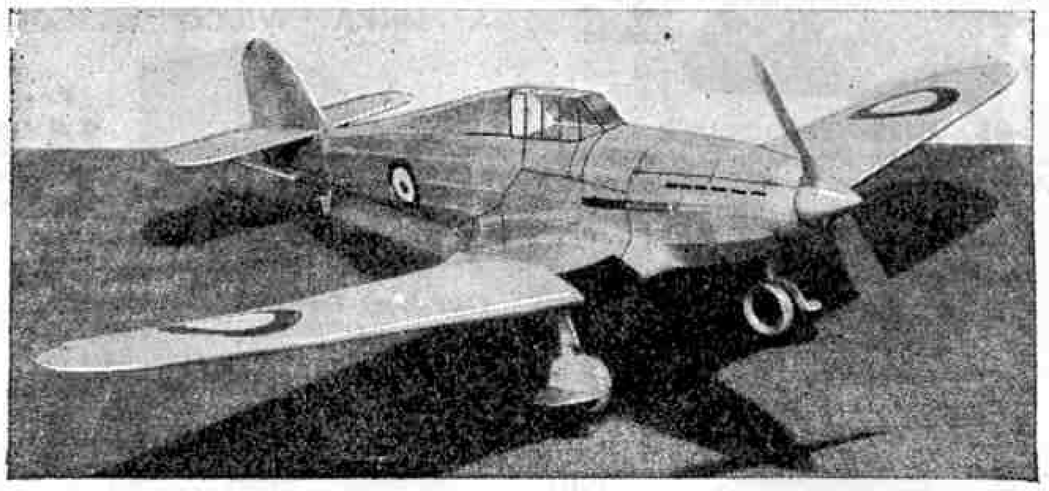

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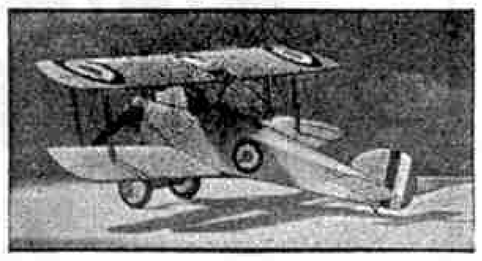

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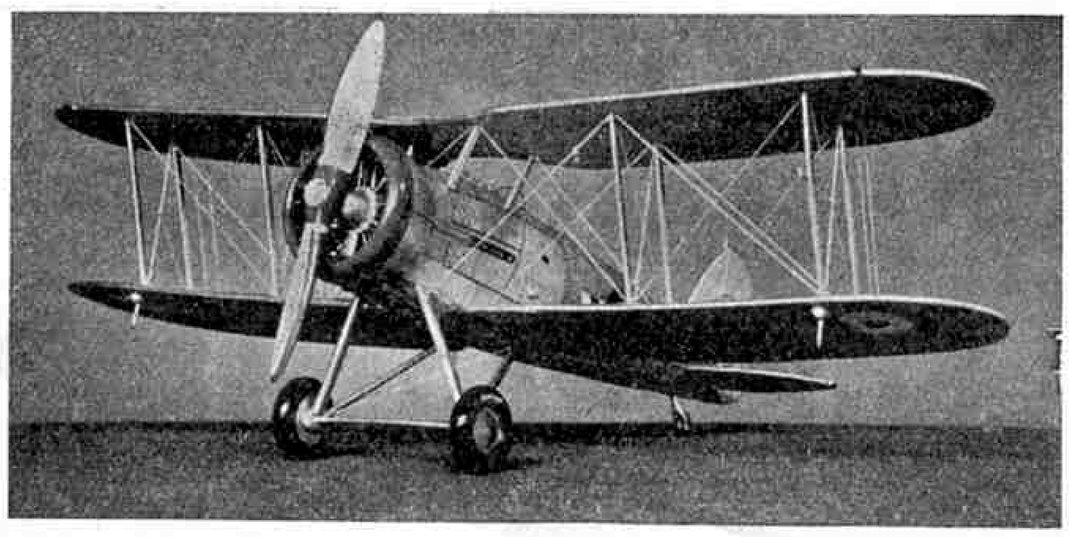

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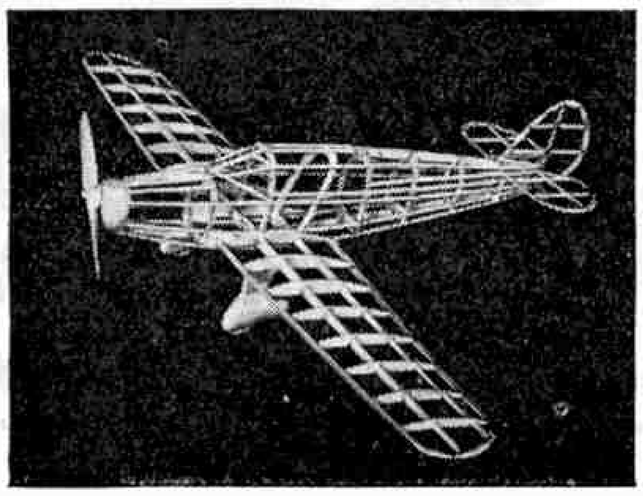

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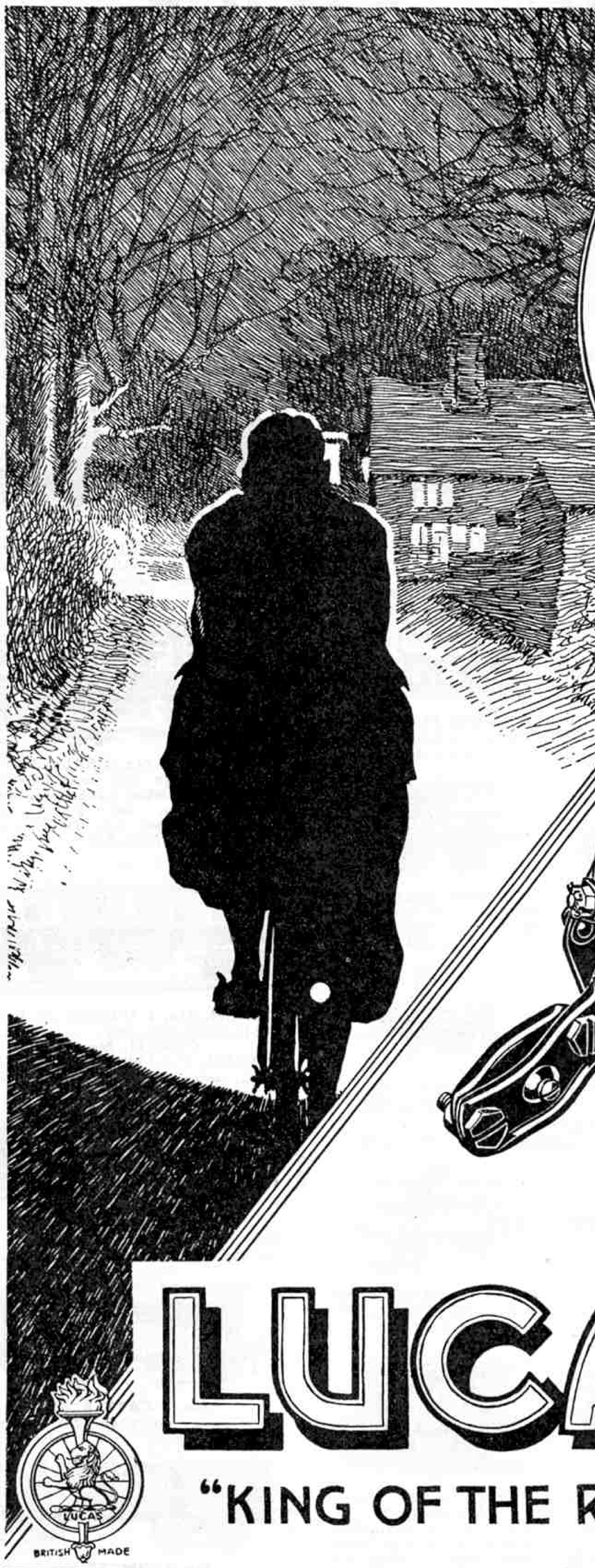

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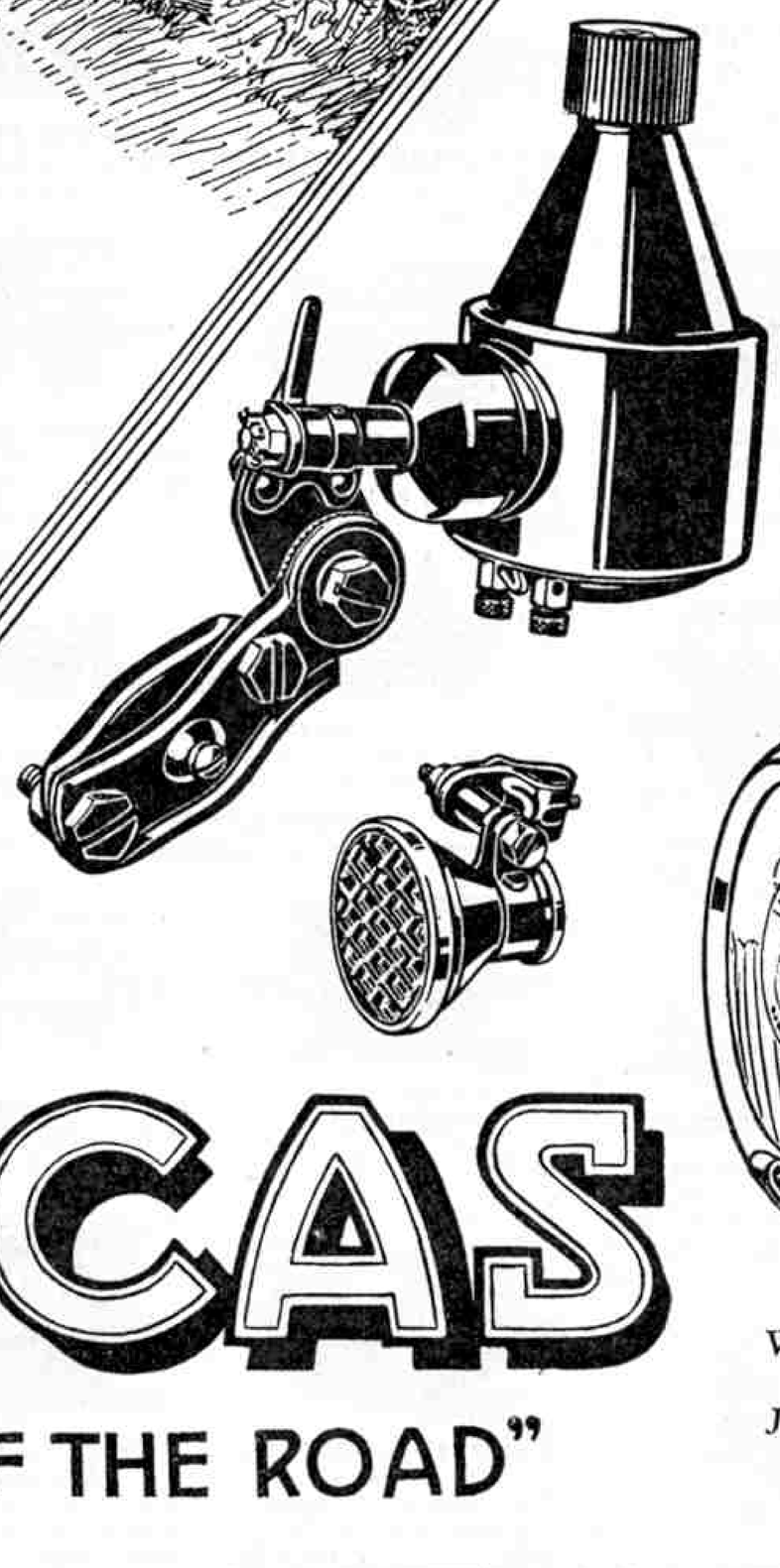

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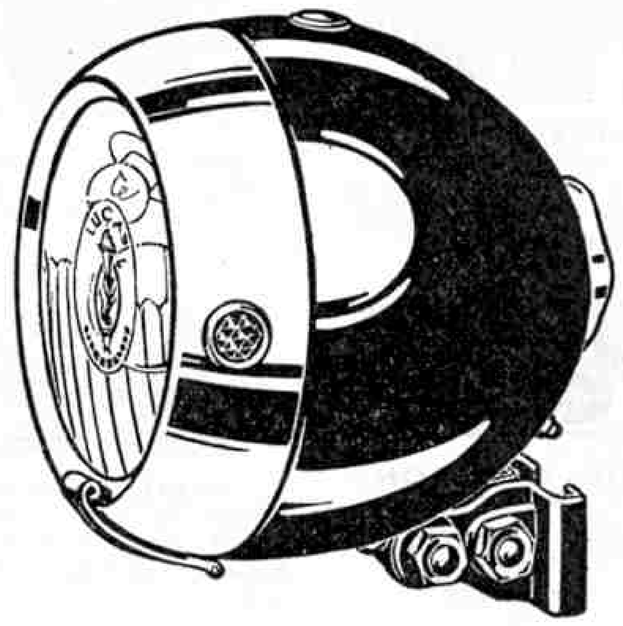

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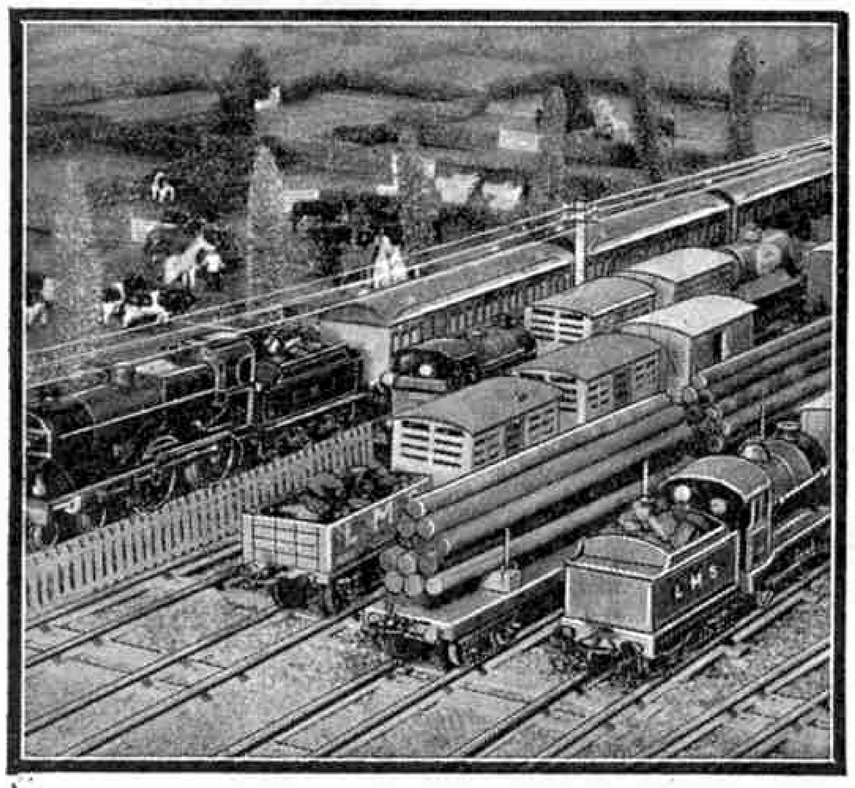

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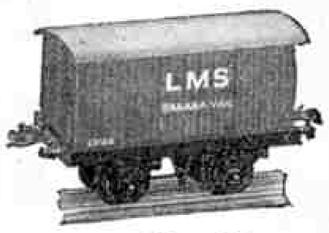

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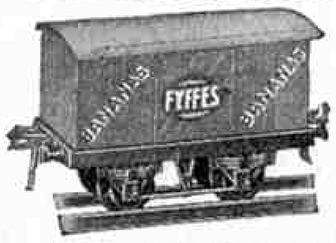

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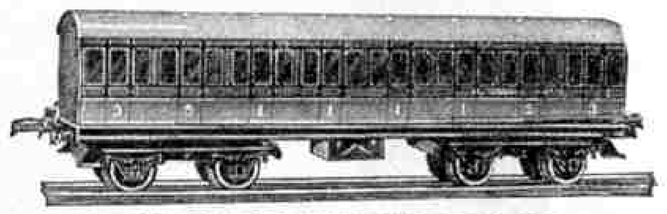

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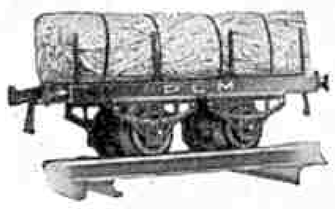

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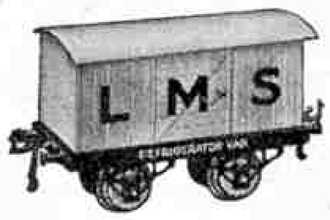

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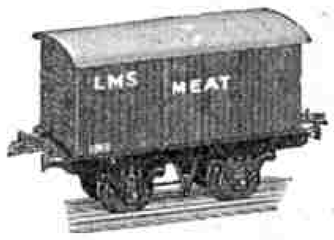
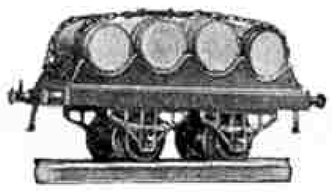
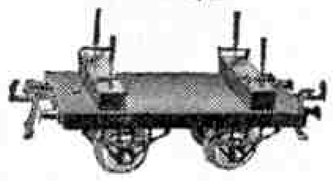


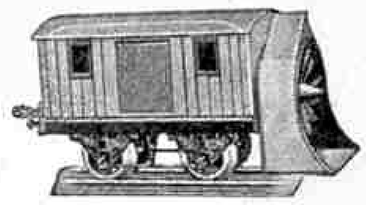
MEAT VAN
This is a very realistic model. Available lettered L.M.S only. Price **1/9**



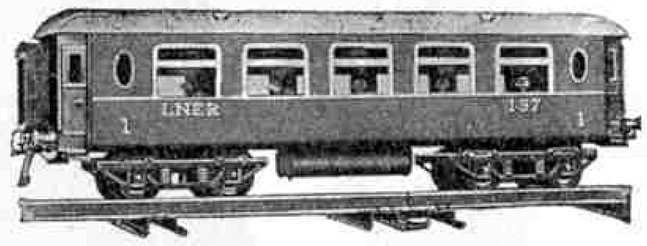
BARREL WAGON
This is another interesting model of a type of wagon used in France and other European countries.
Price **2/6**



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport.
Price **1/6**

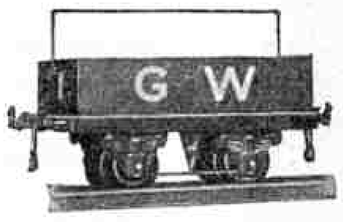


SNOW PLOUGH
With revolving plough.
Price **3/9**

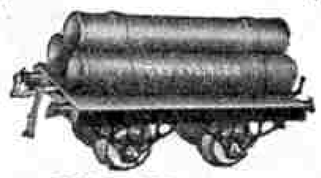


COACH, No. 2 SALOON
Realistic in design and beautifully finished. Two types are available: L.N.E.R. (as illustrated) enamelled brown, and L.M.S. enamelled maroon. Suitable for 2-ft. radius rails only.
Price **9/6**

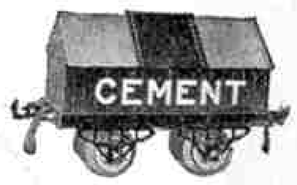
WINE WAGON DOUBLE BARREL
An attractive model artistically enamelled in red and green. Price **4/6**



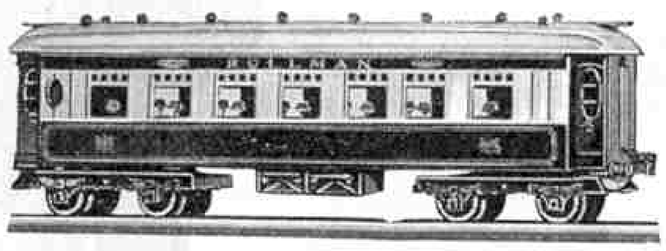
***OPEN WAGON "B"**
Similar to Hornby Wagon No. 1 but fitted with centre tarpaulin supporting rail.
Price **2/-**



GAS CYLINDER WAGON
Finished in red, lettered gold. Price **1/11**



CEMENT WAGON
The door at the top opens. Finished in bright red.
Price **2/6**

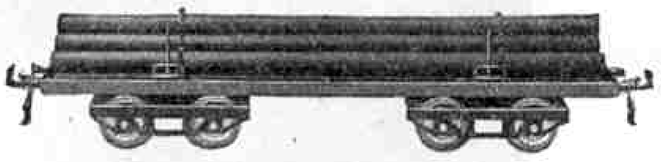


COACH, No. 2 SPECIAL PULLMAN
For 2-ft. radius rails only. Price **13/-**

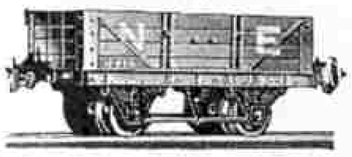
COACH, No. 2 SPECIAL PULLMAN COMPOSITE
For 2-ft. radius rails only. Price **14/-**

TROLLEY WAGON
Finished in brown and blue. Suitable for 2-ft. radius rails only. Price **3/9**

TROLLEY WAGON
Fitted with two Cable Drums. Price **4/3**



No. 2 LUMBER WAGON
Fitted with bolsters and stanchions. For 2-ft. radius rails only. Price **2/11**



***No. O WAGON**
Price **1/6**

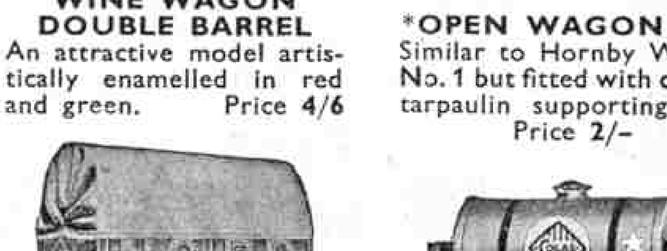
***No. 1 WAGON**
(Illustrated).
Price **1/9**

COAL WAGON
Similar to Hornby Wagon No. 1. Fitted with an embossed representation of coal.
Price **2/3**

OIL TANK WAGON "MOBILOIL"
Finished in battleship grey. Price **2/-**

No. 1 PETROL TANK WAGON, "SHELL-B.P."
Price **2/-**

***No. 2 CATTLE TRUCK**
Opening doors. For 2-ft. radius rails only. Price **4/6**



COACH, No. 2 PULLMAN
For 2-ft. radius track only. Price **9/6**

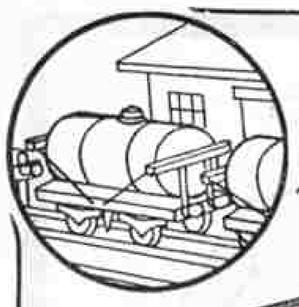
No. O MILK TRAFFIC VAN
An attractive model. Available lettered G.W. only. Price **1/9**

CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof. Price **2/9**

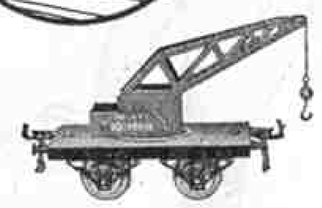
No. 2 TIMBER WAGON
For 2-ft. radius rails only. Price **2/6**

Lettered L.M.S., L.N.E.R., G.W. or S.R.

MECCANO LTD., BINNS ROAD, LIVERPOOL 13

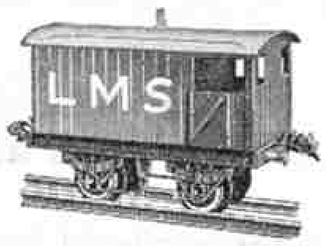


HORNBY ROLLING STOCK

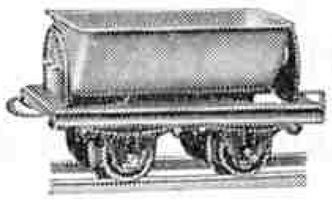


No. 1 CRANE TRUCK
The Crane revolves on its base. Price **2/11**

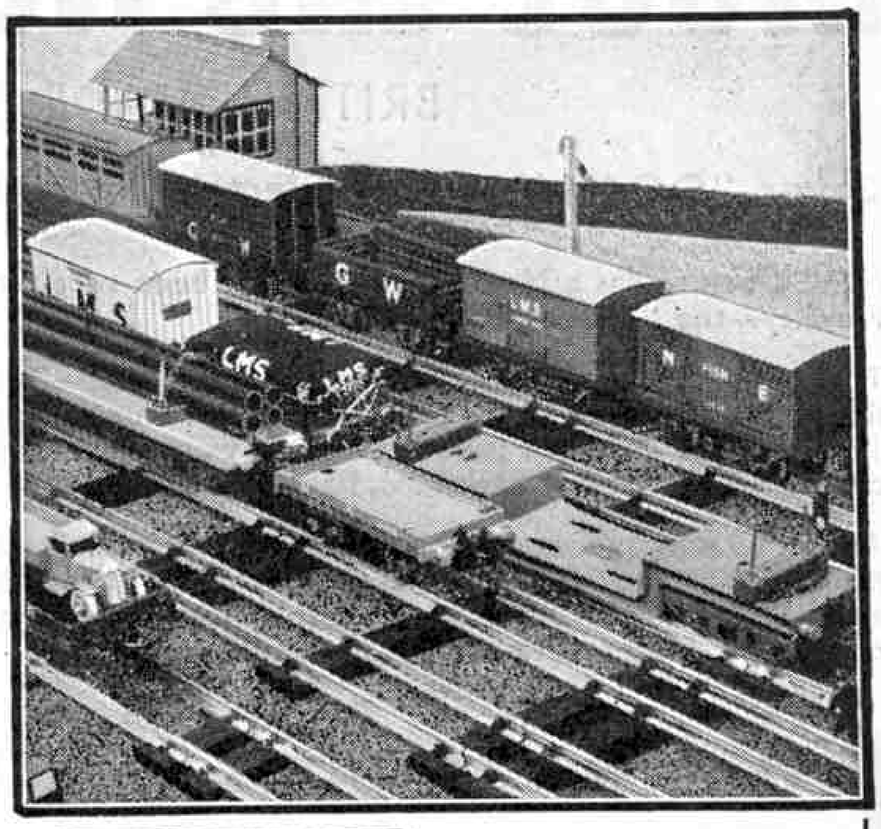
No. O ROTARY TIPPING WAGON
Price **1/6**

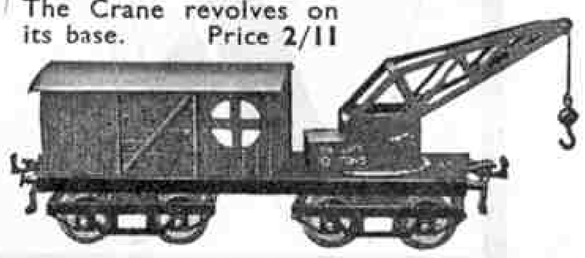


BRAKE VAN
Opening doors, in L.M.S. or G.W. lettering. Price **2/11**

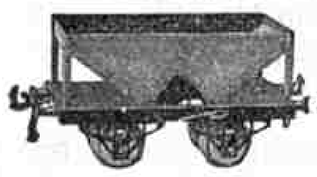


MO SIDE TIPPING WAGON
Tips to either side. Price, **1/-**

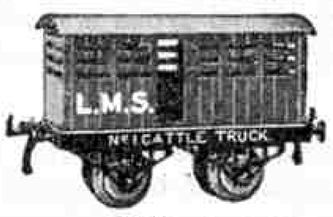




***BREAKDOWN VAN AND CRANE**
Sliding doors. For 2-ft. radius rails only. Price **5/11**

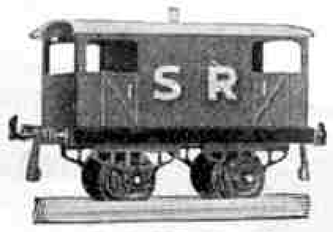


***HOPPER WAGON**
Mechanically unloaded. Price **3/6**

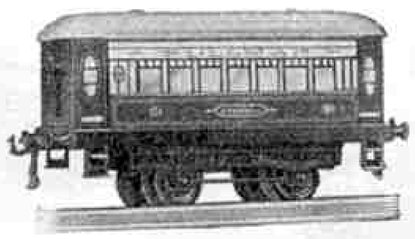


***No. 1 CATTLE TRUCK**
Sliding doors. Price **2/9**

CABOOSE
As used on American railways. Price **2/6**

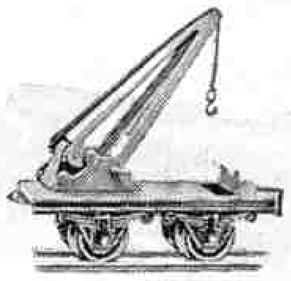


BRAKE VAN
Opening doors. In N.E. or S.R. lettering. Price **2/11**



COACH, No. 1 PULLMAN
Price **2/9**

***GUARD'S VAN**
Price **2/6**

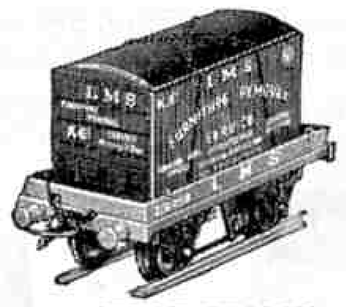


MO CRANE TRUCK
Crane revolves on its base. Price **1/-**

MILK TANK WAGONS
"NESTLE'S MILK"
Price **4/6**
"UNITED DAIRIES"
Price **4/6**

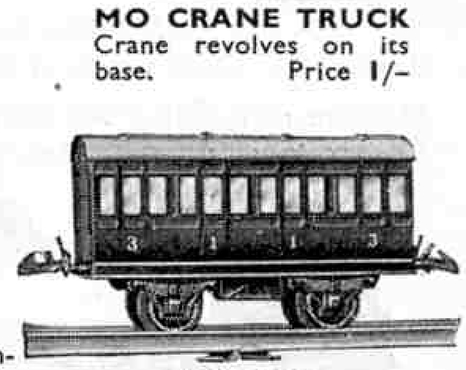
TANK CAR (American Type)
As used in America for the conveyance of oil, etc. Price **1/9**

COACH, No. 1 PULLMAN COMPOSITE
Price **2/9**



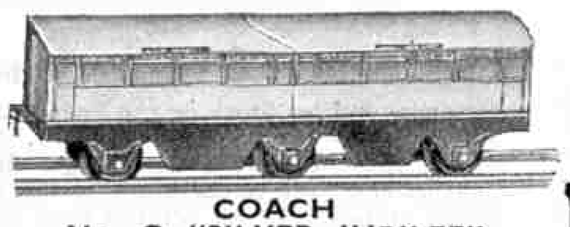
***FLAT TRUCK**
Complete with Container. Price **2/-**

CONTAINERS
L.M.S.R. (Furniture), L.N.E.R. (Goods), G.W.R. (Insulated), S.R. (Ventilated).
Price **6d.** each

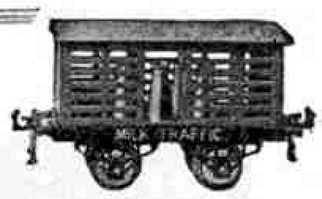


***COACH, No. 1 PASSENGER**
Price **2/6**

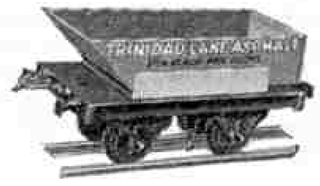
No. 1 PETROL TANK WAGON "REDLINE-GLICO"
Price **2/-**



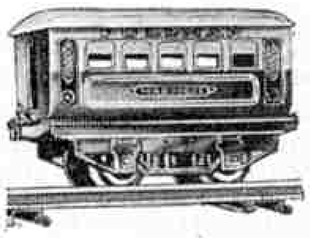
COACH
No. O "SILVER JUBILEE"
Articulated. Finished in silver and grey. Price **1/9**



No. 1 MILK TRAFFIC VAN
Opening doors. Contains four milk cans. Price **2/11**
Separate Milk Cans. Price, each **1½d.**



No. 1 ROTARY TIPPING WAGON
Price **2/6**

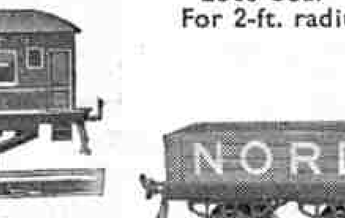


COACH M1/2 PULLMAN
Price **1/-**

No. 1 PETROL TANK WAGON "ESSO"
Price **2/-**

OIL TANK WAGON "ROYAL DAYLIGHT"
Price **2/-**

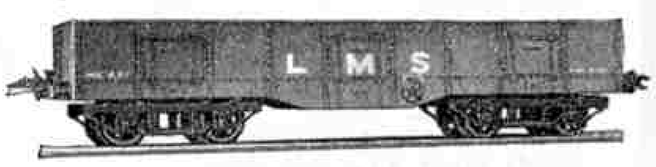
***No. 2 LUGGAGE VAN**
Opening double doors. For 2-ft. radius rails only. Price **4/6**



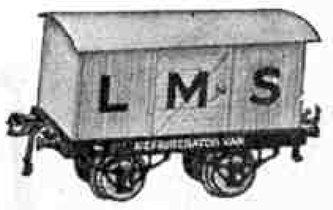
PULLMAN CAR
American Type (as illustrated).
Lettered "Washington" or "Madison."
Price **1/6**

Continenta lType. "Mitropa" No. O
Lettered "Mitropa." Price **1/6**

WAGON
(French Type)
Lettered "NORD."
Price **3/3**

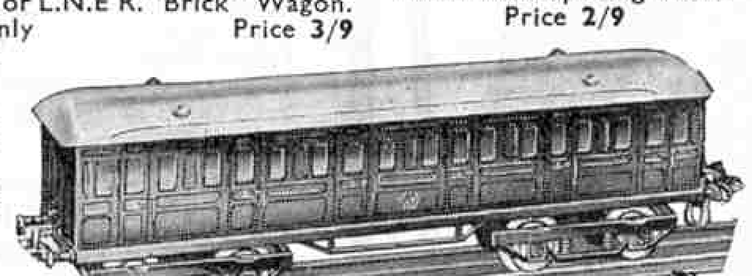


No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W.R. and L.M.S.R. "Loco Coal" Wagons, or L.N.E R. "Brick" Wagon. For 2-ft. radius rails only Price **3/9**



***REFRIGERATOR VAN**
Beautifully enamelled. Fitted with opening doors. Price **2/9**

COACH, RIVIERA "BLUE" TRAIN
"Dining Car" or "Sleeping Car."
For 2-ft. radius rails only. Price **12/6**



COACH, METROPOLITAN
For 2-ft. radius rails only. First class or Brake-third. Price **7/6**

Lettered L.M.S., L.N.E.R., G.W. or S.R.

MECCANO LTD., BINNS ROAD, LIVERPOOL 13

Meet the New "TWINS"

BRITISH MADE THIS YEAR!

Gauge "OO." 14" radius. Electrically controlled. 12 volts d.c. or 14 volts a.c.

NEVER before has a Model Railway outfit been received with such enthusiasm as the wonderful Table Novelty—the "Twin Train" railway.

This year—better than ever—come the new sets—Passenger 45/–, Goods 42/–, and Suburban 35/–, finished in either L.M.S. or L.N.E.R. colours, true to English standard types and made in Northampton! Just imagine! You can have two trains working on the same line, at different speeds, yet separately controlled, forward or backward, fast or slow.

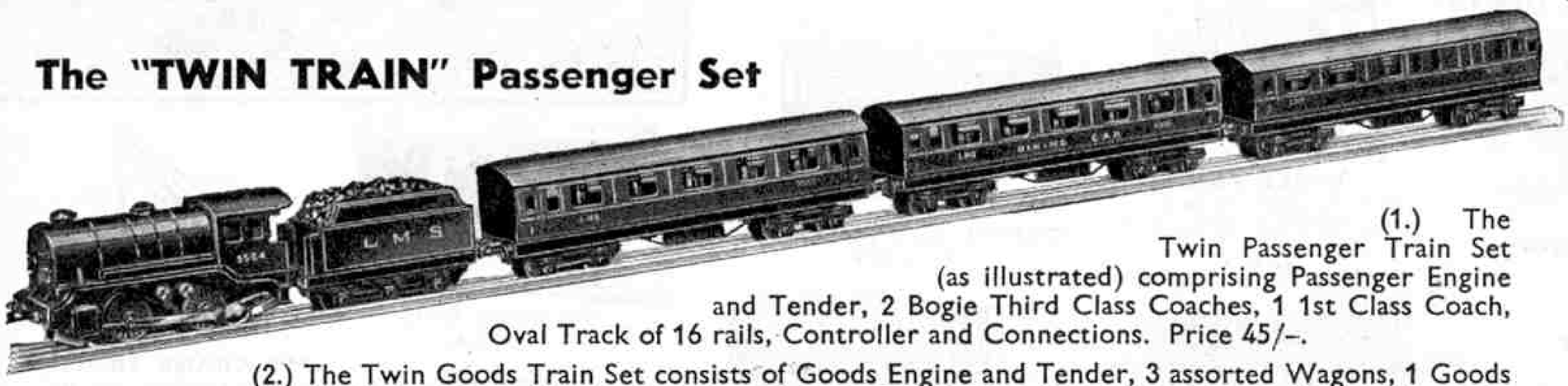
An entire railway system, complete with Stations, Branch Lines, and every kind of equipment, can be laid out on a table 6 ft. × 3 ft., and with two simple controls, the trains can be stopped, started and reversed at will. The ideal Christmas Present—inexpensive—based on ingenious mechanical and electrical discoveries, and interesting to boys of all ages.

N.B.

SEE INSIDE BACK COVER for BASSETT-LOWKE gauge "O" railways and ship models for the season!

Each Twin Train Set is complete with an illustrated Book of Instructions, and can be worked off the a.c. house mains through the Twin Train transformer, price 10/6. For two or more trains the large transformer, price 21/–, is required.

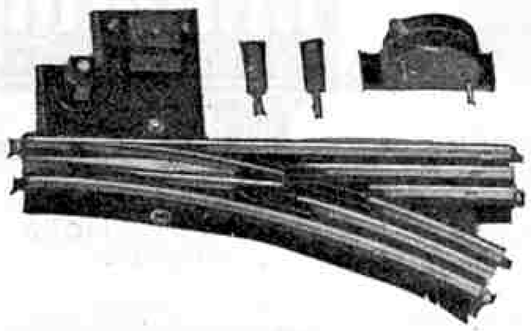
The "TWIN TRAIN" Passenger Set



(1.) The Twin Passenger Train Set (as illustrated) comprising Passenger Engine and Tender, 2 Bogie Third Class Coaches, 1 1st Class Coach, Oval Track of 16 rails, Controller and Connections. Price 45/–.

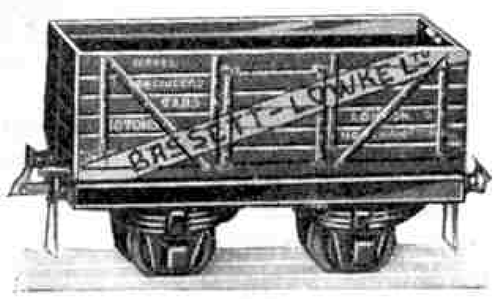
(2.) The Twin Goods Train Set consists of Goods Engine and Tender, 3 assorted Wagons, 1 Goods Brake Van, Oval Track of 14 rails, Controller and Connections. Price 42/–.

(3.) The Twin Suburban Set is made up of Passenger Tank Locomotive, 2 Suburban Coaches, Guard's Van, Oval Track, Controller and Connections. Price 35/–.



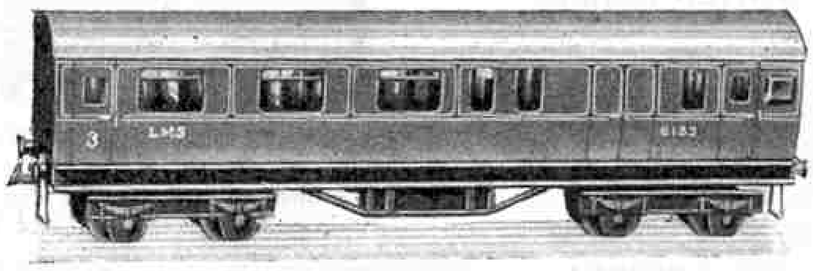
Electrically controlled Points. 16/6 per pair. (Hand-operated 10/6 per pair).

Twin Train Track is mounted on a smart black Bakelite base giving perfect insulation and smooth running. All the rails, points and crossovers have neat snap joints, making a firm foundation for the layout. This idea sets a new standard in model track construction.



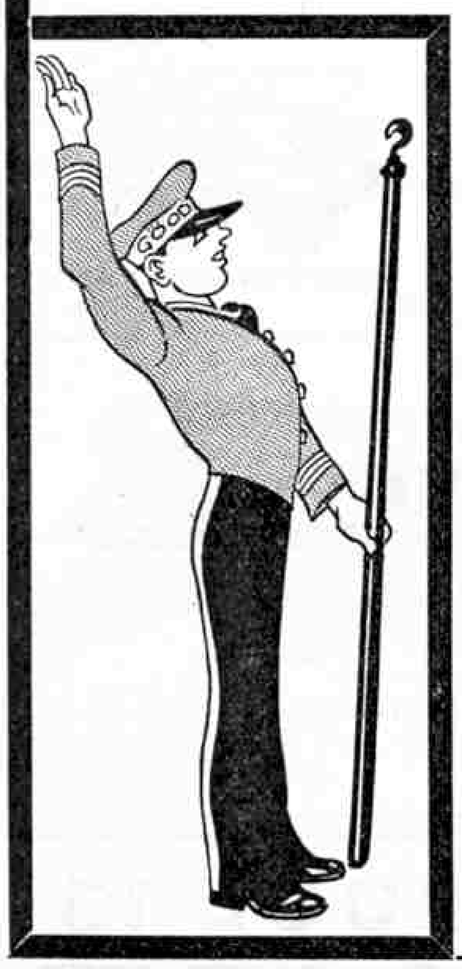
Bassett-Lowke Private Owner's Wagon. 1/–.

The Twin Train railway is amply stocked with smart goods wagons, in correct English colours. Each vehicle is fitted with special automatic couplings, making the hobby more fascinating, as "real railway" operations such as goods yard shunting, can be carried out.



L.M.S. Bogie Brake Third, 6½ inches long, 3/–.

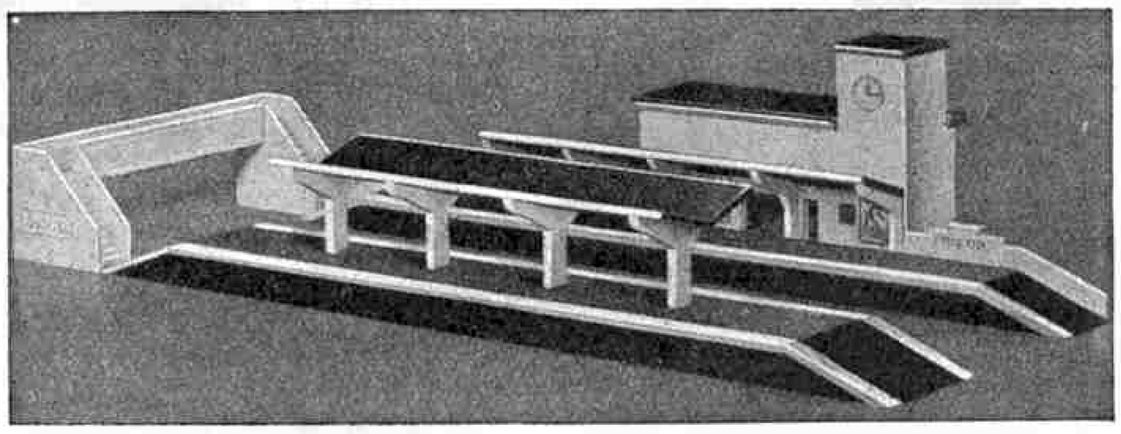
Passenger Rolling Stock on the Twin Train railway has improved in both quantity and quality this year. There are 1st class Coaches, Dining and Restaurant Cars, Bogie Brake Thirds and Suburban Coaches and Vans, in correct lettering, lining and colours of either L.M.S. or L.N.E.R. All vehicles have automatic couplings and are fitted with realistic Celastoid windows.



SOME TWIN TRAIN PRICES.

Rail—straight or curved ...	9d. per 7½" length
Terminal Rail	1/6
Crossing	3/6 each
Suburban Coaches and Vans	1/6 each
All other Coaches	3/– each
Open Wagons	1/– each
Covered and Timber Wagons	1/3 each
Goods Brake Vans and Coal Wagons	1/6 each
Milk and Oil Wagons ...	1/9 each
Large Terminus Station ...	15/– 27" long
Signal Box	2/3 4½" long
Engine Shed	4/6 7" long
Single Upper Quadrant Signal	1/–
Yard Lamp to light up ...	2/6
Telegraph Pole	4d.

For full details and prices get TT.17, the "Twin Train" booklet. Free from Northampton.



Twin Train Buildings.

Here are shown the Twin City Station (6/9). Island Platform to match (4/6), and Overbridge with angle approach (2/6). There are many other smart accessories to make your Table Railway Live.

BASSETT-LOWKE LTD.

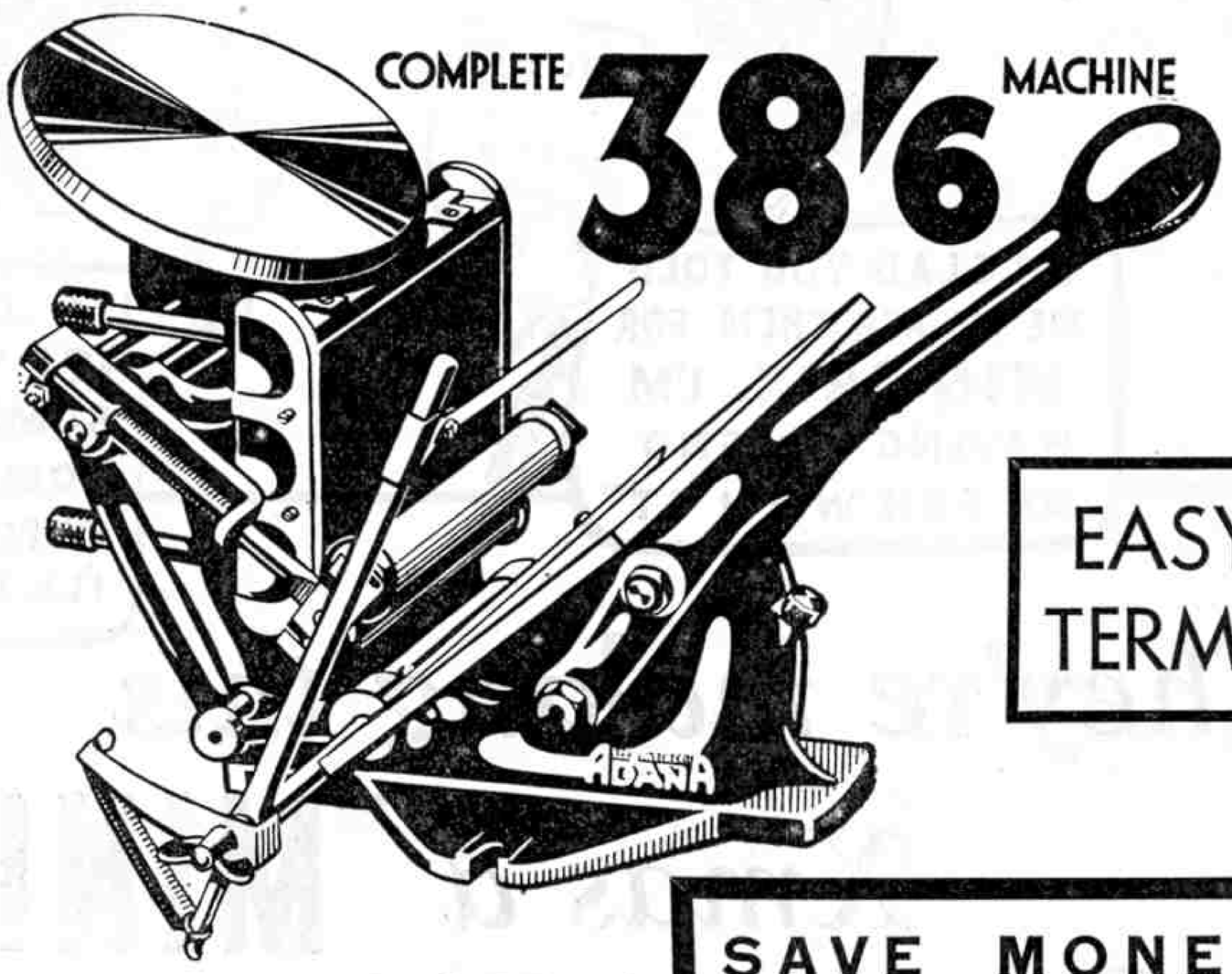
LONDON: 112, High Holborn, W.C.1

MANCHESTER: 28, Corporation Street

NORTHAMPTON

BOYS!!! MAKE YOUR HOBBY PRINTING

Big Businesses Built from Small Beginnings



COMPLETE **38/6** MACHINE

EASY TERMS

FASCINATING PASTIME LUCRATIVE HOBBY

There are more ways of making money with an efficient printing machine than by any other mechanical device. The outstanding methods below have stood the test of time and prove this without question. Saying nothing of the boom that will shortly develop for small printing in view of the forthcoming Coronation of our King.

START A PRINTING BUSINESS

Make big profits by starting a small printing business and getting your friends and acquaintances to give you their work and to introduce others. Since the introduction of Adana Patented printing machines 14 years ago, thousands have built up fine businesses from small beginnings. A big printing business occupying important premises in one of the main streets of Liverpool was started by small early efforts with an Adana. A retired employee from the London District Railway organised a well-conducted printing business seven years ago at the age of sixty-five, and is still going strong. Full particulars of both these wonderfully successful efforts and many others are described in the literature waiting your request. In order to provide the utmost assistance to all purchasers it has been decided to present free of charge a copy of a 2s. 6d. book, 85 *Ways of Making Money*. This book contains over 100 pages and is fully illustrated. It gives advice to beginners and describes in detail 85 ways of profit-earning from print.

FOOTBALL COMPETITION PRINTING

Sweepstakes, Draws, Sports Competitions, such as Football and Racing Doubles, Pontoon Cards, Stop-Watch Competitions, etc., may be run under certain conditions as specified in the Betting and Lotteries Act of 1934. A Publication issued by D. A. Adana, relating to Gaming and Betting, by Leslie Kark, M.A. (Oxon.), Barrister-at-Law, is published free on request. D. A. Adana has always been fully alive to the wants of the sports printer. Special cards, type and all the necessary accessories of the very latest design have always been available for Adana users at very low prices.

CLUB PRINTING

Programme

Clubs of every description can save considerable money by employing an Adana Machine. Club Notices, Fixture Cards, Admission Cards, Rule Books, and, in fact, every variety of this type of Printing comes within easy scope of an Adana. Many Churches also and other organisations find that an Adana Machine saves its cost over and over again in next to no time.

PRINT BOOKS

Print and Publish books that have a definite market value. There are thousands of people who have certain acquired knowledge who could easily write and print small publications that would probably have a very considerable sale at 6*d*. or 1*s*.

Large sums of money are made by printing and selling publications. In this side of small print there exists records of Great Romances of the World. Individuals who have written and printed entirely themselves books of no small size; stories of these great efforts would fill many volumes. There is not room here to give an account of these, but one of considerable current interest is the marvellous efforts of Mr. James Richards, who wrote to Mr. Adana some little while ago, stating: *I am enclosing a bit of my own production; it may be of interest to you.* It was actually a translation of the New Testament Epistle of St. James in the Sussex dialect. Mr. Adana, who read the book, was tremendously impressed by the printing of it, not only by the excellent quality of the writing, but by the sheer craftsmanship of the production. In response to a letter Mr. Adana sent to Mr. Richards at his home at Tunbridge Wells, it brought back another parcel containing yet six more books and a letter explaining the circumstances under which they had been produced. Mr. Richards revealed that not only was he the printer of these books, but also the author. He hides his identity under the pen-name of Jim Cladpole. Of the six books, five were written in Sussex dialect. There have been many fine achievements on the part of users of Adana Machines, but we have yet to discover the like of James Richards' accomplishments. Think of it, in his translation of the Gospel according to St. Mark there are 80 pages.

XMAS PRIVATE GREETING CARDS

Christmas Private Greeting Cards—one of the most lucrative sidelines of the small printer. Not only are profits great, but the market is tremendous. D. A. Adana caters for the printer to a very great extent in this business (see special illustrated literature). A very fine selection of the highest quality cards are held in stock right into December **ALL COMPLETELY PRINTED, LEAVING JUST THE SPACE FOR THE NAME AND ADDRESS TO BE INSERTED BY THE PRINTER.** In the case of the folded cards, fifteen blank inserts are also included with every dozen cards for special greetings where necessary. Nicely bound blank albums are also available for a few pence for the purpose of making up specimen books.

SAVE MONEY BY DOING YOUR OWN PRINTING

Make money indirectly by doing your own printing and thus save pounds. A printing Machine in the hands of the smallest or biggest industrial concern can be a great asset. *The following well-known Businesses have not only purchased an Adana Automatic Printing Machine, but have actually purchased more Machines after having given the first a trial:*

Messrs. Courtaulds Ltd.
Messrs. Guest, Keen & Nettlefolds Ltd.
Messrs. The Gramophone Co. Ltd.
Messrs. W. H. Smith & Sons Ltd.
Messrs. United Africa Co. Ltd.
Messrs. Ruston Bucryus Ltd.
Messrs. Pullum & Metcalfe Ltd.
Messrs. Archibald Turner & Co. Ltd.
Messrs. British Drug Houses Ltd.
Messrs. Telegraph Condenser Co. Ltd.
Messrs. Telephone Manufacturing Co. Ltd.
Messrs. Lincolnshire Canners Ltd.
The Crown Agents for the Colonies
The Co-operative Wholesale Society
London County Council Education Authorities
Church Missionary Society
Middlesbrough Education Committee

His Majesty's Government are one of the biggest users of Adana Automatic Printing Machines.

FREE BOOK

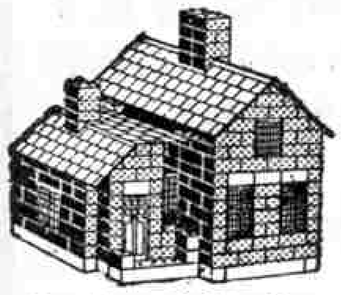
Send at once for a most fascinating Book, **'POUNDS FROM PRINT,'** together with illustrated literature and samples of work.

D. A. ADANA

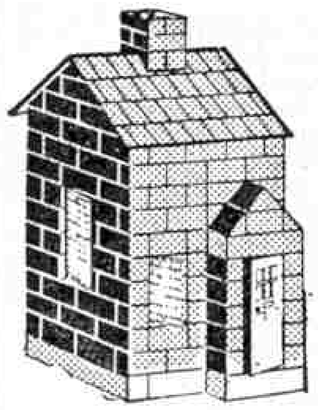
(Dept. M.C.18),
17/18, CHURCH ST., TWICKENHAM
London Depot: 1, Ludgate House, Fleet Street, E.C.4
Manchester Depot: 60, Oldham Street, Manchester

ARE YOU GOING IN FOR THE MINIBRIX £100 PRIZE COMPETITION?

They're making this Xmas a **"MINIBRIXMAS"**



Farmhouse built with No. 4 Set.



Cottage built with No. 2 Set.

THE MINIBRIX hobby has caught on like wildfire. Boys everywhere are enthusiastic about these rubber bricks that build up so easily into an array of splendid, realistic models.

If you haven't a MINIBRIX, you don't know half the fun you're missing.

Think of being able to build up, brick by brick, just as real builders do, such fine models as illustrated here, besides hosts of others.

All stores and most good toyshops are having big displays of MINIBRIX this Christmas. So go to the nearest one and ask them to show you MINIBRIX—you'll agree it's the finest, the most thrilling building toy you've ever seen.

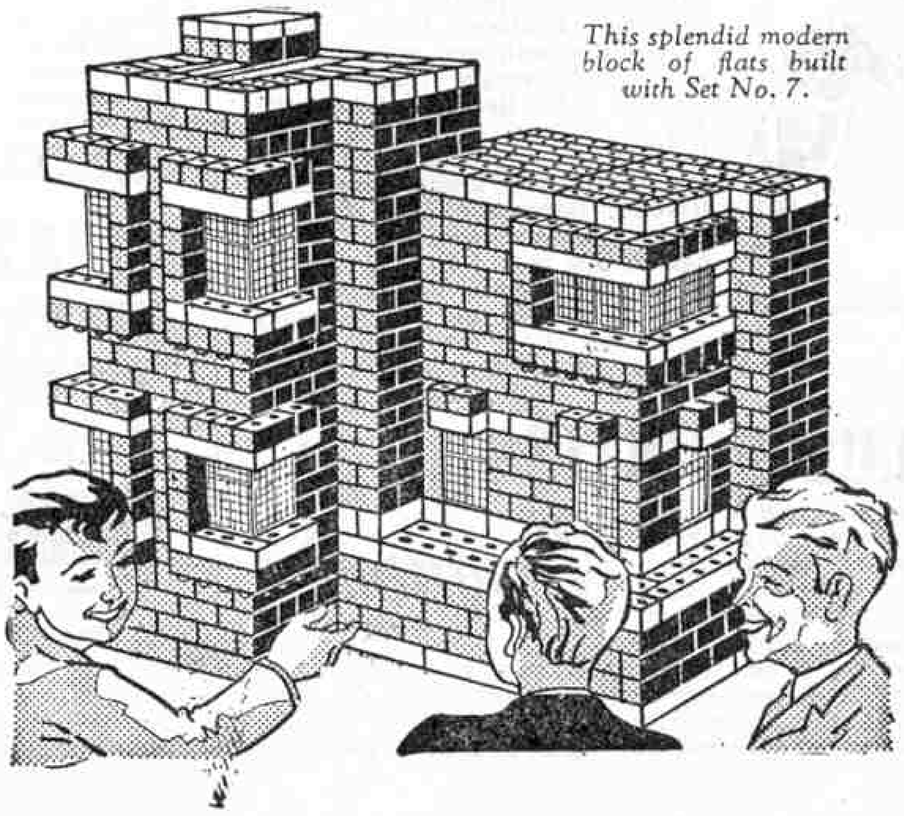
You can get a set from 5/- to 63/- and every set contains enough parts to build ever so many beautiful and interesting models.

If you want to know all about MINIBRIX, write Dept. M.M. for illustrated leaflet, to PREMO RUBBER CO. LTD., Petersfield, Hants.

£100 IN PRIZES
FOR CLEVER BUILDERS
Full details of prize competition can be obtained from your dealer or direct from us.

MINIBRIX is obtainable from:

Army and Navy Stores, Civil Service Stores, Gamages', Hamley's, Harrods', Hobbies' branches, Selfridges', Whiteleys' and most other stores and good toyshops in London and Provinces.

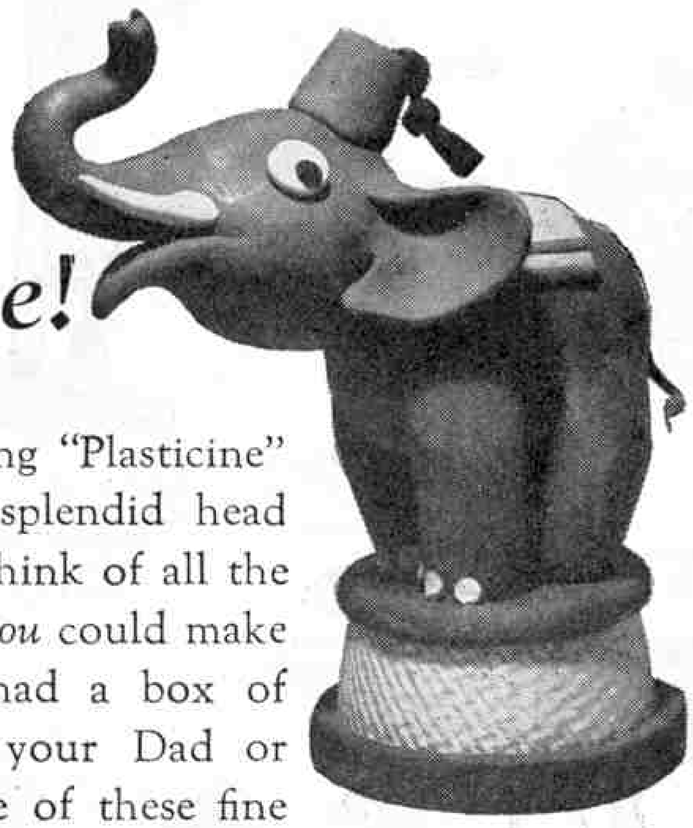


This splendid modern block of flats built with Set No. 7.

MINIBRIX
A COMPLETE BUILDING SYSTEM IN MINIATURE
WITH *All-rubber* SELF LOCKING BRICKS
PREMO RUBBER COMPANY LIMITED, PETERSFIELD, HANTS

I'm a figure of fun..

you can model in Plasticine!



Look at this amusing "Plasticine" elephant and the splendid head of a Red Indian. Think of all the wonderful models *you* could make at Xmas if you had a box of "Plasticine." Ask your Dad or Mother to put one of these fine modelling outfits in your stocking. Tell them that there are outfits at all prices from a penny to a guinea. Obtainable everywhere.

These are actual models in "Plasticine."

★

Build a Village (series of 6), **6d.** each, *post free 9d.*

Elfin Wonderland, **2'6** each, *post free 3'-.*

Designer, **5'6** and **12'6**, *post free 6'1 and 13'5.*

Complete Modeller, **4'-**, *post free 4'6.*

Post free rates for Great Britain; abroad extra.

H A R B U T T ' S

Plasticine

Write for illustrated price lists to—

HARBUTT'S PLASTICINE LTD., 99, BATHAMPTON, BATH

Drydex TORCH BATTERIES keep bright longer

From all good dealers and Exide Service Stations

R.181

All Change for **MILBRO**

FOR TRUE-TO-SCALE

ACCURACY and **RELIABILITY**

It is because of this true-to-scale accuracy and the perfect engineering skill behind every Milbro model that they can be **guaranteed** to give first-class, trouble-free track performance. See the various Milbro models at your nearest dealers—study the workmanship, the detail and the beautiful finish. Then you will realise why they do all, and more, than is expected of them

Write for 1936-7 catalogue (price 6d.) to-day.

MILLS BROS. (Model Engineers) LTD., Dept. F.S., St. Mary's Rd., Sheffield, 2.

★

FLYING SCOTSMAN

A perfect true-to-scale model of the famous L.N.E.R. engine "Flying Scotsman" is priced at £22/5/-. Electric 6-8 volts. Gauge O

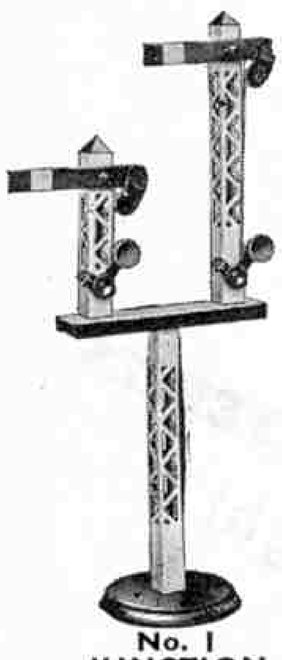
HORNBY ACCESSORIES

There is a splendid range of Railway Accessories in the Hornby Series, each one built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway may be constructed and operated in exactly the same manner as a real raliway.

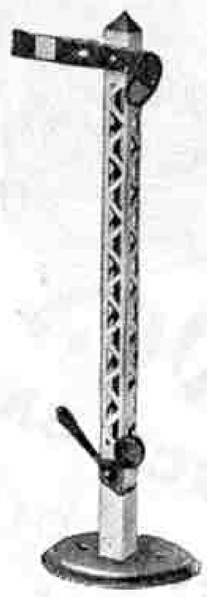
A selection of Hornby Accessories is shown on this and the opposite page. Ask your dealer to show you the full range.

No. 2 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price **2/6**

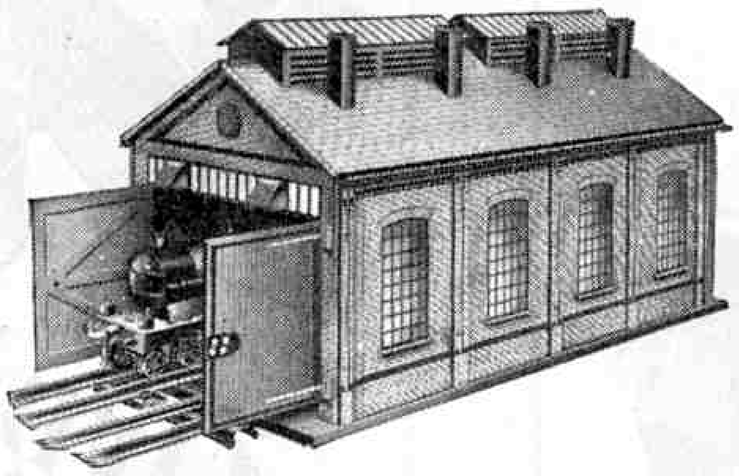
No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price **4/9**



No. 1 JUNCTION SIGNAL
"Home" or "Distant."
Price **2/9**



No. 1 SIGNAL
"Home" or "Distant."
Price **1/–**



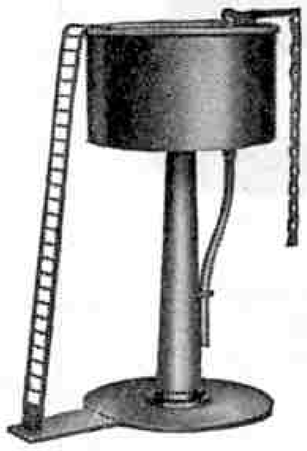
No. 2 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 17½ in.
Price **22/6**

No. 1 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price **1/6**

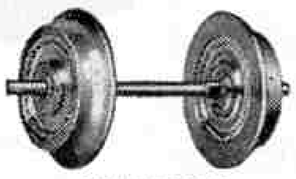
No. 1 SIGNAL GANTRY
"Home" or "Distant."
Price **4/11**

No. 1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price **3/–**

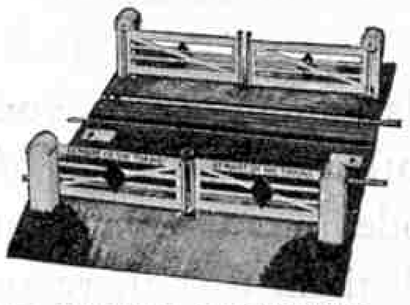
TELEGRAPH POLES
Price per pair **3/6**



No. 2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price **5/9**

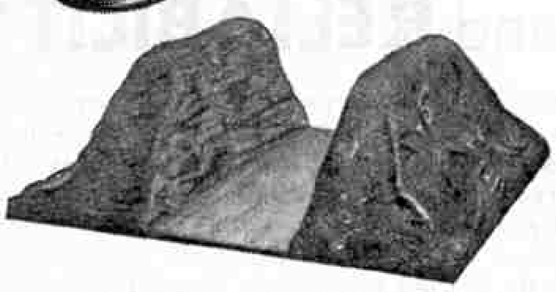


MANSELL WHEELS
These solid die-cast Wheels can be fitted to Hornby Coaches, Vans, etc.
Price per pair **3d.**



No. 2 LEVEL CROSSING
Measures 13½ x 10½ in., with two tracks of gauge O rails in position.
Price **5/6**

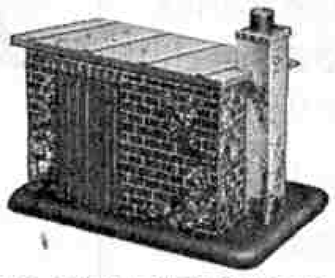
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price **7/6**



CUTTING No. 4 (STRAIGHT)
This is a double cutting, mounted on a base over which the railway track is laid.
Base measurement: Length 15⅜ in., width 15 in. Price **6/–**

No. 1 SIGNAL CABIN
Finished in colours.
Price **2/6**

No. 2 SIGNAL CABIN
Dimensions: Height 6½ in., width 3⅛ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired. Price **3/9**

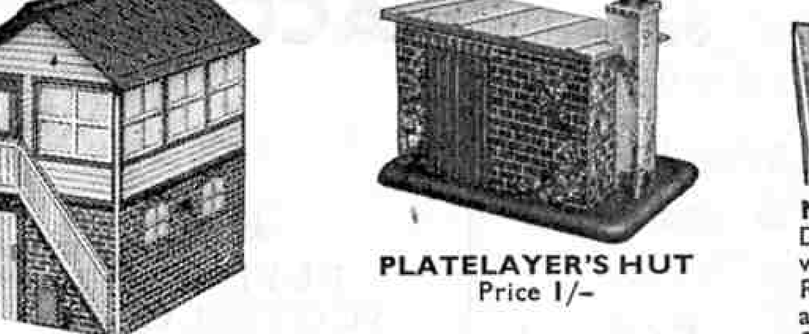


PLATELAYER'S HUT
Price **1/–**

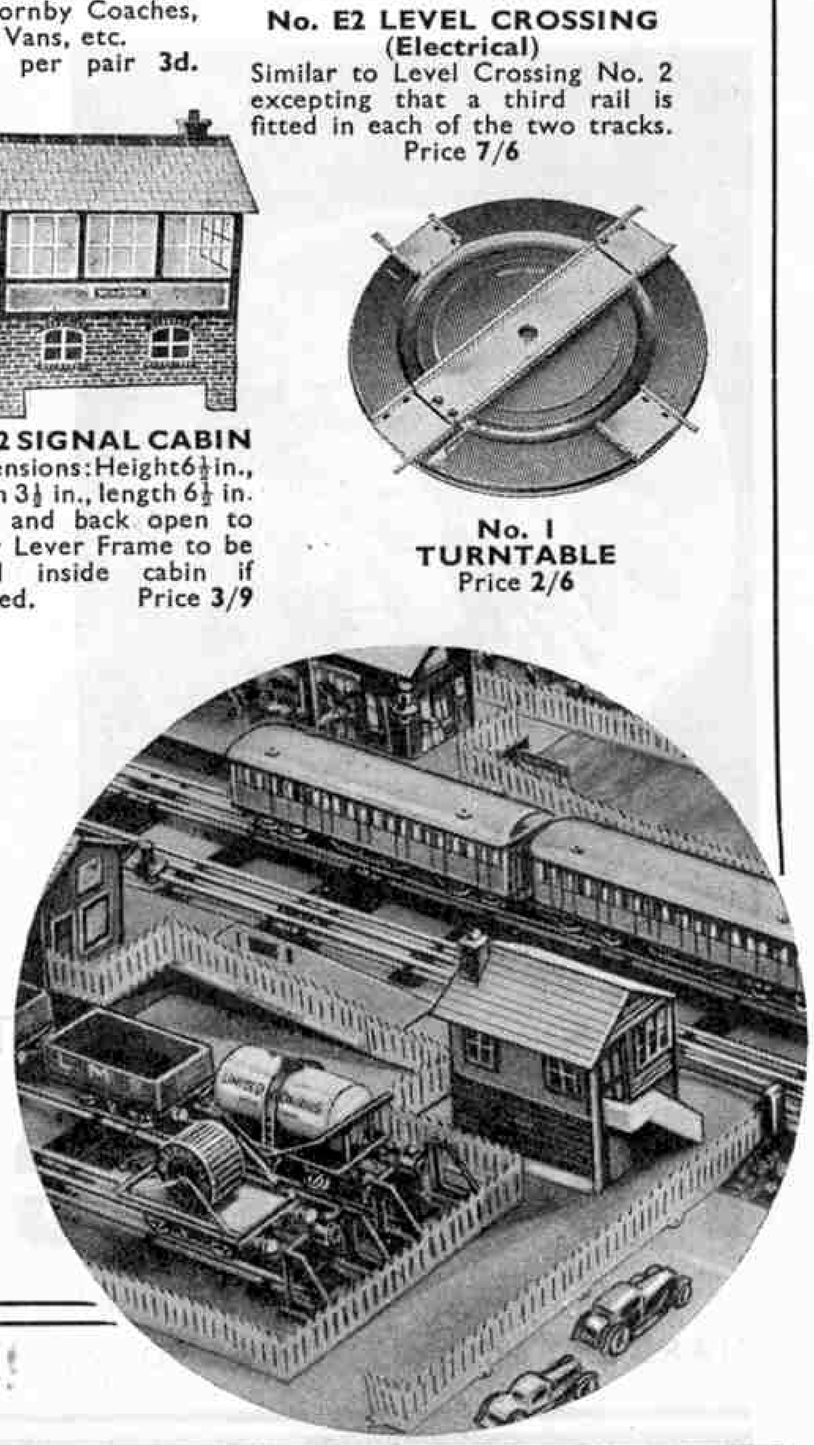
No. 1 TURNTABLE
Price **2/6**

No. 1 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price **15/–**

VIADUCT Price **6/6** **VIADUCT (Electrical)** Price **7/6**
VIADUCT Centre Section only ... ... Price **4/–**
VIADUCT (Electrical) Centre Section only ... Price **4/6**

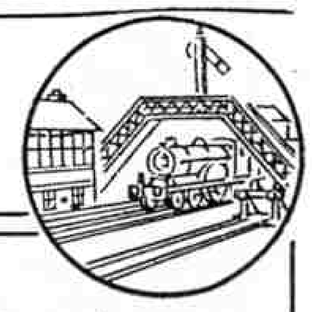


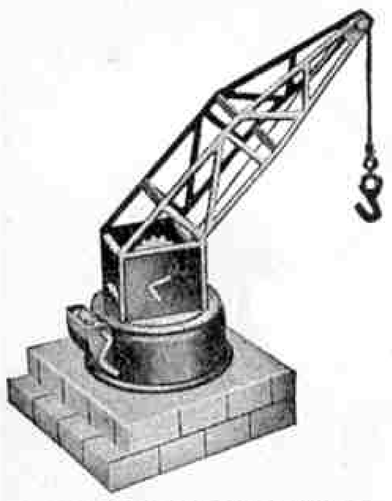
No. 1 STATION
Length 16¾ in., width 6 in., height 6 in. Price **4/6**



MECCANO LTD., LIVERPOOL 13

HORNBY ACCESSORIES



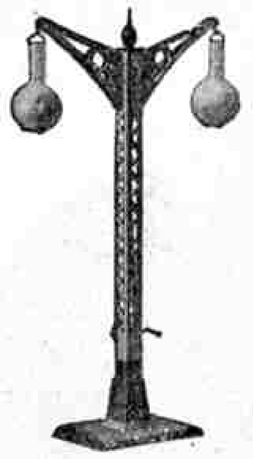


PLATFORM CRANE
Fitted with a crank handle and ratchet mechanism.
Price **3/11**

M STATION SET (7 pieces). Price **3/–** complete.
The components of the M Station Set may be purchased separately.
M Signal Box. Price **4d.** M Signal. Price **4d.** M Station. Price **1/–.** M Telegraph Pole No. 1. Price **3d.** Wayside Station. Price **9d.**

No. 1E LAMP STANDARD ELECTRICAL
(Single, as illustrated.)
Price **2/11**

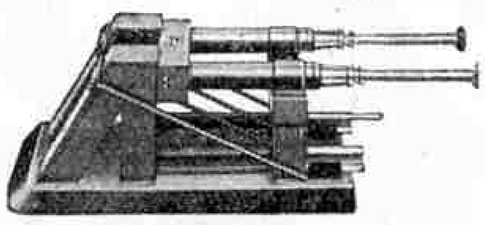
No. 2E LAMP STANDARD ELECTRICAL
(Double.)
Price **3/3**



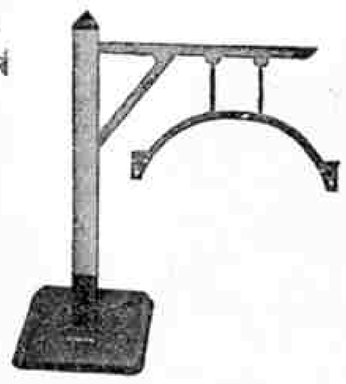
No. 1 LAMP STANDARD
(Single.)
Price **3/3**

No. 2 LAMP STANDARD
(Double, as illustrated.)
Price **3/9**

STATION HOARDING
This is a realistic accessory, suitable for the station platform. Brightly coloured.
Price **6d.**



No. 2 BUFFER STOPS
(Hydraulic type.) Price **5/6**



LOADING GAUGE
(Illustrated.)
Price **2/3**

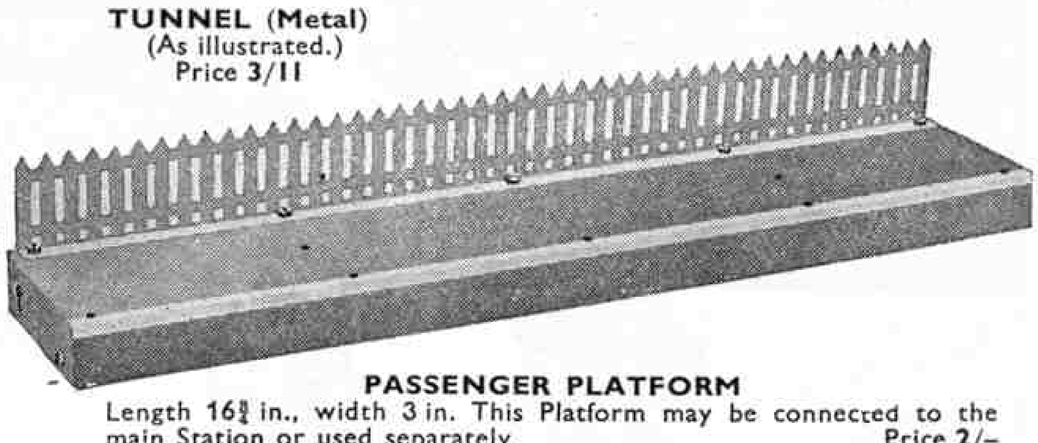
M LOADING GAUGE
Price **1/–**

TUNNEL (Metal)
(As illustrated.)
Price **3/11**

No. 1A FOOTBRIDGE
Complete with Signals. Price **4/6**

No. 1 FOOTBRIDGE
Without Signals. Price **2/11**

MECCANO LUBRICATING OIL
Price per bottle **6d.**



PASSENGER PLATFORM
Length 16¾ in., width 3 in. This Platform may be connected to the main Station or used separately. Price **2/–**
The white Paled Fencing may be purchased separately. Price per length **6d.**

No. 7 RAILWAY ACCESSORIES
Watchman's Hut, Brazier, Shovel and Poker. Price **10d.**

No. 2 STATION
Built up in three detachable sections. Named "Brighton," "Wembley," "Ripon," or "Bristol." Length 2 ft. 9 in., breadth 6 in., height 7 in. Price **8/–**

POSTERS IN MINIATURE
These Posters are beautifully printed in full colours.
No. 1 Series. Packet of 51 Price **6d.**
,, 2 Series. Packet of 51 ,, **6d.**

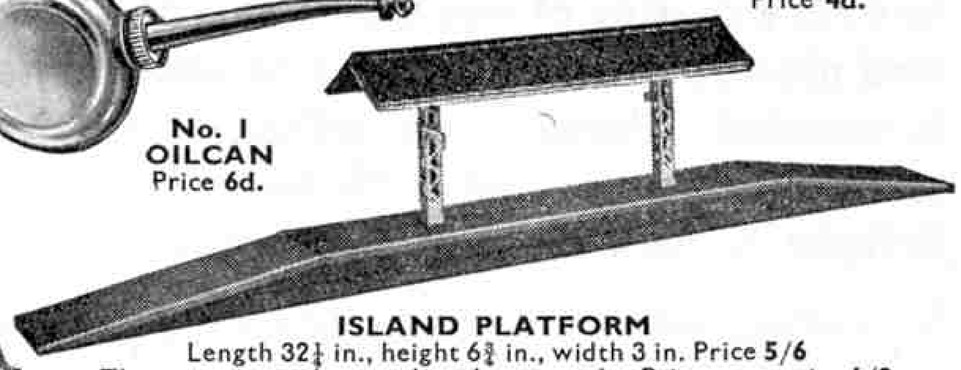
POSTER BOARDS
Designed to carry Hornby Posters. Provided with lugs for attachment to Paled Fencing, etc. Packet of 6 (3 large and 3 small). Price **4d.**

No. 2 OILCAN
("K" Type.) The oil is ejected drop by drop by depressing the valve. Polished copper. Price **3/6**

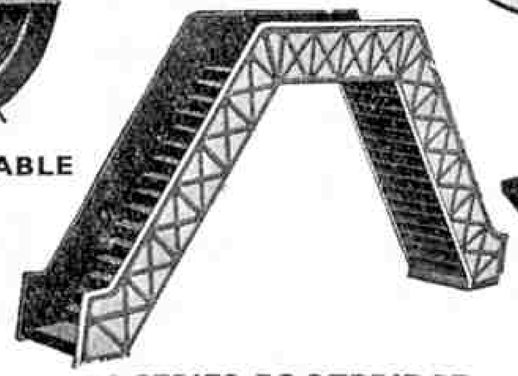
No. 2E STATION
This Station is fitted for electric lighting, otherwise it is the same as No. 2 Station, illustrated above. Price **9/3**

No. 2 TURNTABLE
Price **3/9**

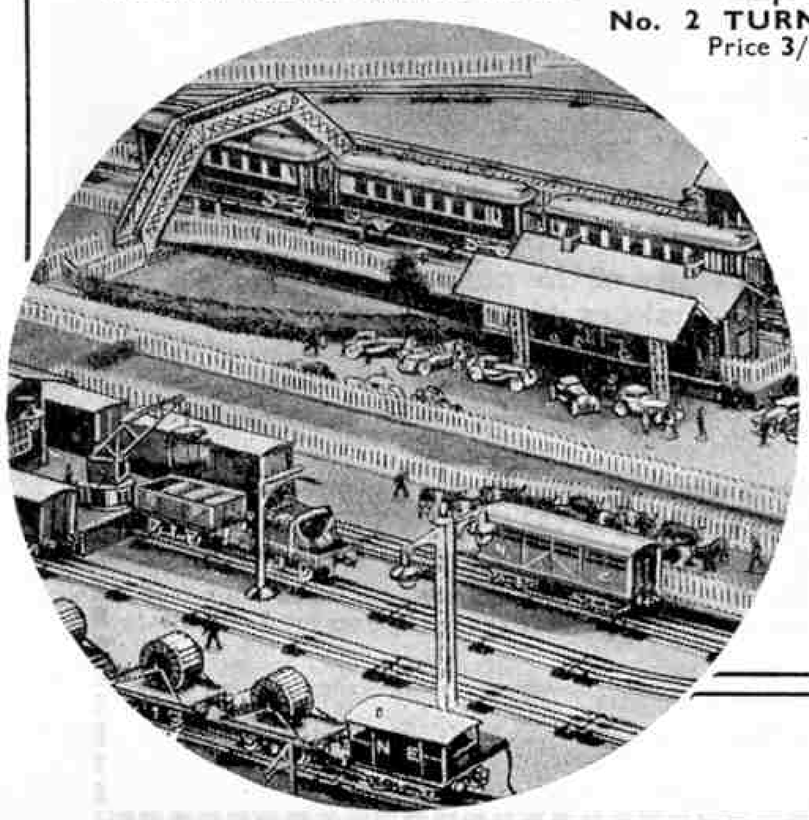
No. 1 OILCAN
Price **6d.**

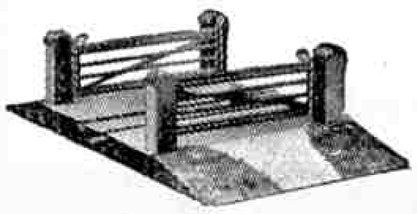


ISLAND PLATFORM
Length 32½ in., height 6¾ in., width 3 in. Price **5/6**
The ramps may be purchased separately. Price, per pair, **1/9**

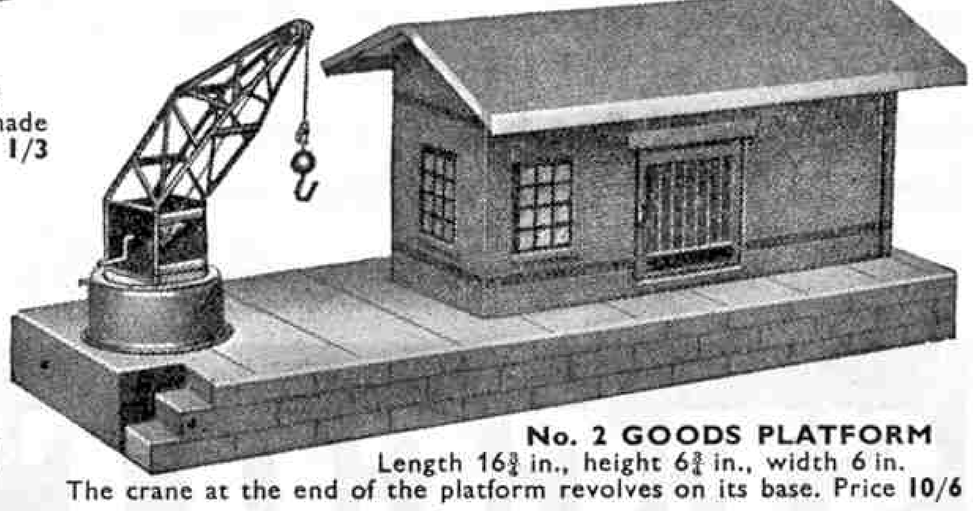


M SERIES FOOTBRIDGE
This strongly-built Footbridge is made to span a single track. Price **1/3**



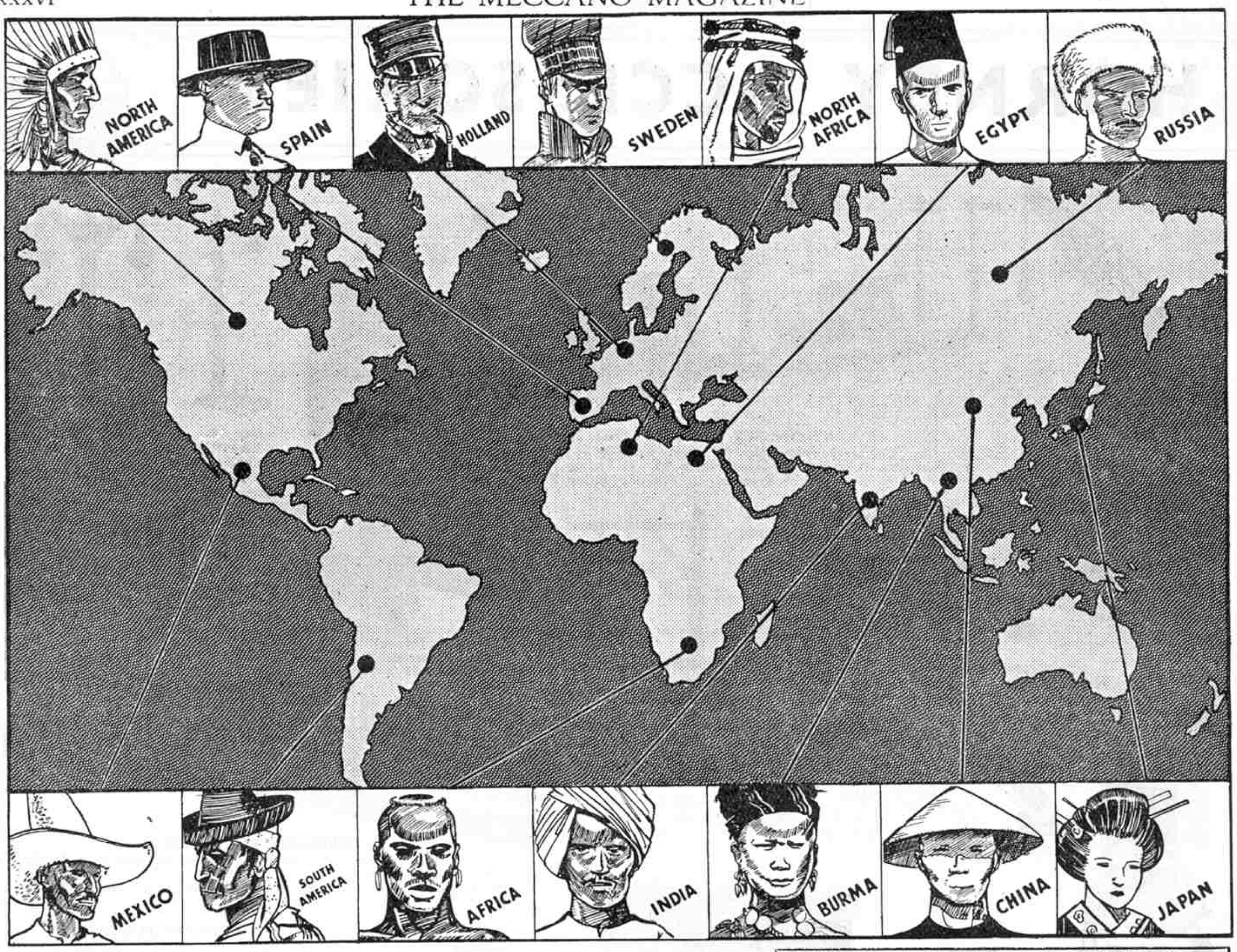


No. 1 LEVEL CROSSING
Suitable for a single track only and has gauge O rails in position.
Price **2/11**



No. 2 GOODS PLATFORM
Length 16¾ in., height 6¾ in., width 6 in.
The crane at the end of the platform revolves on its base. Price **10/6**

MECCANO LTD., LIVERPOOL 13



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In every corner of the earth Seccotine is used for making and mending articles large or small where real strength is needed. There is no adhesive in the whole world so strong—no adhesive with more uses—that is why Great Britain is called upon to supply every country's need.

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I should like to have, post free, copies of your free booklets which describe the many uses for Seccotine.

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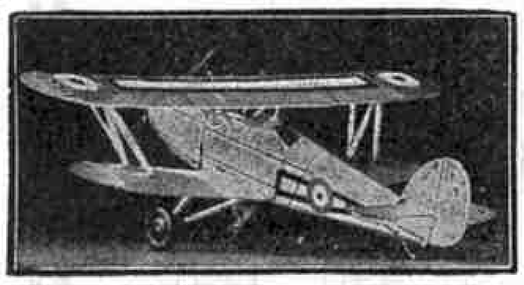
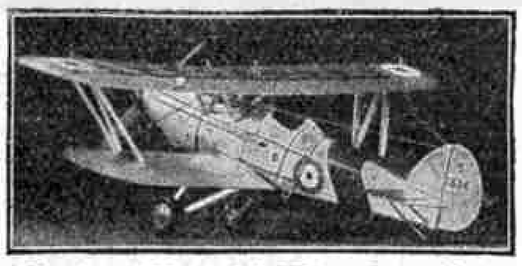
The New . . .

AEROMINORS

MODEL AIRCRAFT CONSTRUCTION SETS $\frac{1}{48}$th Full Size



Hawker "Fury." Wing Span 7½ ins.



Hawker "Nimrod." Wing Span 8¼ ins.

The wing surfaces, fuselage coverings, etc., are accurately designed and printed on sheets of special quality card of varying grades, selected to suit the special purposes they have to fulfil. All internal stiffening is of balsa wood.

Wheels, propeller parts, nose-pieces, etc., are supplied ready-shaped in wood. Tail-planes, also rudders and fins, are made from thin plywood. Struts and undercarriages are constructed of wire. Glue pins, cane, thread for rigging, celluloid, plywood, balsa wood, printed shapes, etc., are all supplied. A very complete illustrated Instruction Sheet is supplied. No special tools or skill are required for making these perfect little scale models.

De Havilland "Moth Major." Wing Span 7½ ins.

AEROMINOR No. 1

Any one of the following types can be made from this kit—"Hart," "Hind," "Demon," "Audax" or "Osprey." Price 3/–. (Postage abroad 1/– extra.)

AEROMINOR No. 2

Either De Havilland "Tiger Moth" or "Moth Major." Price **2/6.** (Postage abroad 1/– ex.)

AEROMINOR No. 3

Either Hawker "Fury" or "Nimrod." Price **2/6.** (Postage abroad 1/– ex.)

ALL ABOVE KITS NOW READY

If you cannot obtain Aerominors from your Local Dealer send your Postal Order direct to:

AEROMODELS LTD.,
No. 5 First Floor, Wellington Building, The Strand, Liverpool 2.

READY SOON

PERCIVAL "VEGA GULL"

(Winner of King's Cup 1936 and Johannesburg Race).

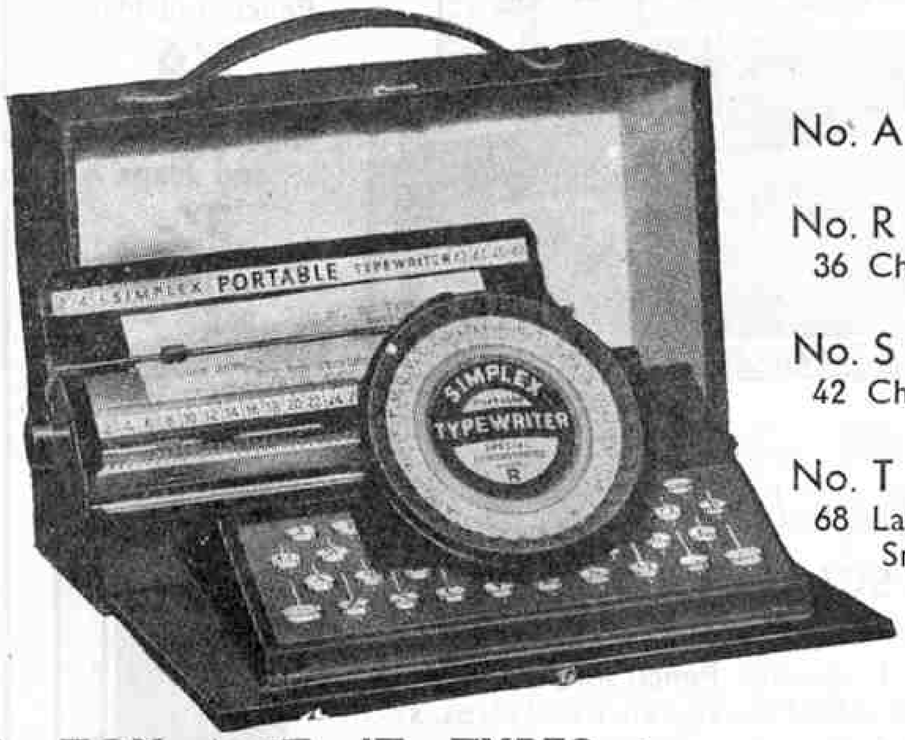
AEROMINOR No. 4

EVERY BOY

will love to possess

The New Portable

SIMPLEX TYPEWRITER



No. A **5′-**

No. R **6′6**
36 Characters

No. S **12′6**
42 Characters

No. T **21′-**
68 Large and Small

A TOY BUT IT TYPES—in snappy portable case. It contains hours of fun and prints full alphabet, numerals, stops, etc. Guaranteed for two years.

A Typewriter and Printing Outfit combined, for letters, list cards, labels, notices.

FROM ALL TOY DEALERS. SEND FOR LIST.

SIMPLEX TYPEWRITER CO.
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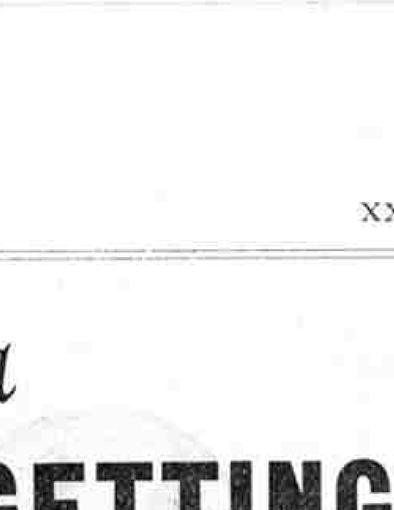
Formula

FOR GETTING A RALEIGH THIS XMAS

Find **FATHER** *then tell him*



RALEIGH = MUCH GOOD EXERCISE IN OPEN AIR + SAVING OF FARES TO SCHOOL + THE FACT THAT YOU GET BETTER SERVICE OUT OF A RALEIGH BECAUSE IT'S GUARANTEED FOR EVER

∴ THE ONLY DECENT THING HE CAN DO IS TO BUY YOU A RALEIGH THIS XMAS

Tell him, too, that the Raleigh is the "easy running bicycle" . . . . and has chip-proof and rust-proof finish . . . . that it is as dependable as time itself . . . . and that he can buy you a Raleigh for as little as £4/7/6 cash, or 5/– down and 12 equal monthly payments of 8/4, with Dunlop Tyres, and the best possible equipment. Get him to include the Sturmey-Archer 3-speed Gear, 20/– extra (cash) or 2/– monthly.

Send now for a free copy of "The Book of the Raleigh" and choose the model you want for Xmas.

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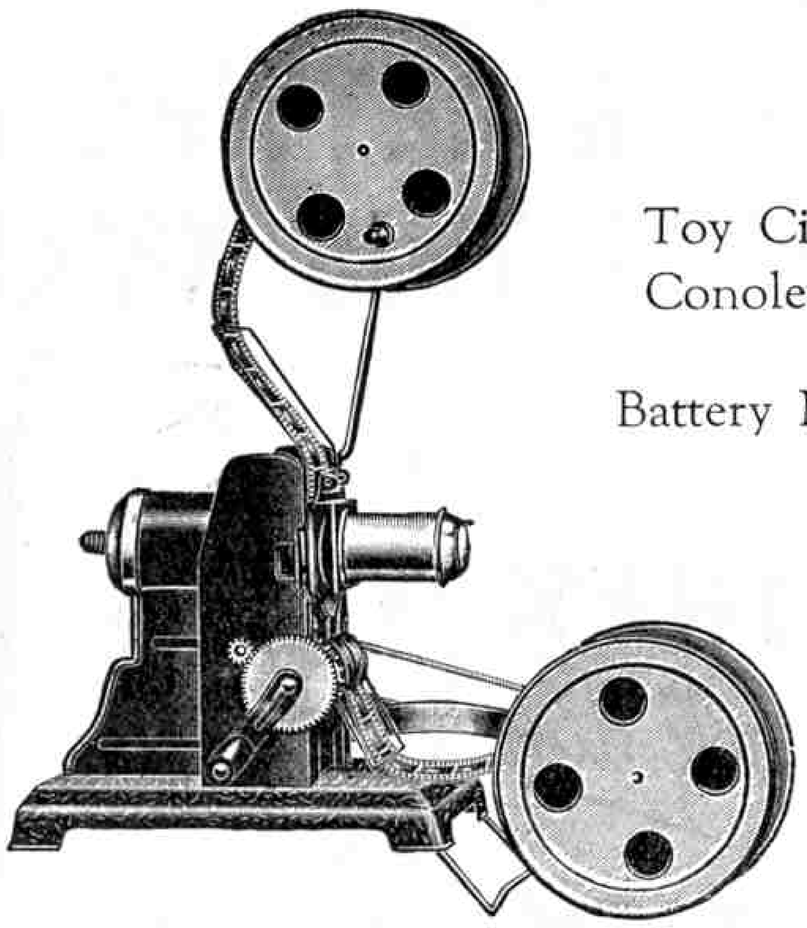
THE ALL-STEEL BICYCLE

Fit the Sturmey-Archer 3-speed gear—the gear that "makes cycling easy"



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Playmate Projectors

Toy Cine Projectors always prove an irresistible attraction. Conoley's popular and sturdy models are much in demand.

Battery Model	No. 402	8′11	Mains Model	No. 490	12′6
	No. 402′1	12′6 ea.		No. 492	15′6
				No. 481	18′6
				No. 482	25′-

- BEAUTIFULLY FINISHED
- STURDILY CONSTRUCTED
- OPTICALLY ACCURATE
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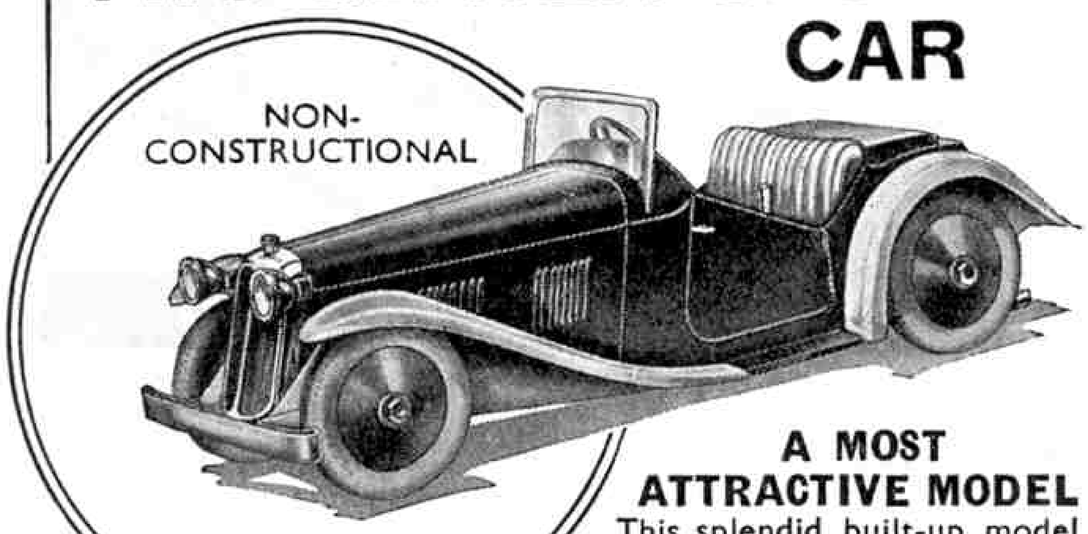
INDCOL PRODUCTS

L. CONOLEY.

83/86, FARRINGDON STREET . LONDON . E.C.

A REALISTIC

TWO-SEATER SPORTS CAR



The model is beautifully made and finished, and is richly enamelled in Blue and Cream

A MOST ATTRACTIVE MODEL

This splendid built-up model represents the modern sports two-seater, a type of car that combines speed and excellent road-holding qualities, and has become increasingly popular during recent years. Speed is suggested by the sweeping lines of the bodywork and mudguards, together with the sloping radiator and wind-screen.

The model faithfully resembles its prototype in all important respects. It is complete in itself, no constructional or assembly work being required. It steers from the wheel, and is fitted with a strong clockwork motor that gives a long and steady run.

Overall dimensions: Length, 8¼ in.; Width, 3¾ in.; Depth 2⅞ in.

Price **6′6**

Manufactured by

Meccano Ltd., Binns Rd., Liverpool 13

A *NEW* *DIARY*

THE PUBLIC SCHOOLS DIARY

Size 4⅝″ × 3⅛″

PRICES:

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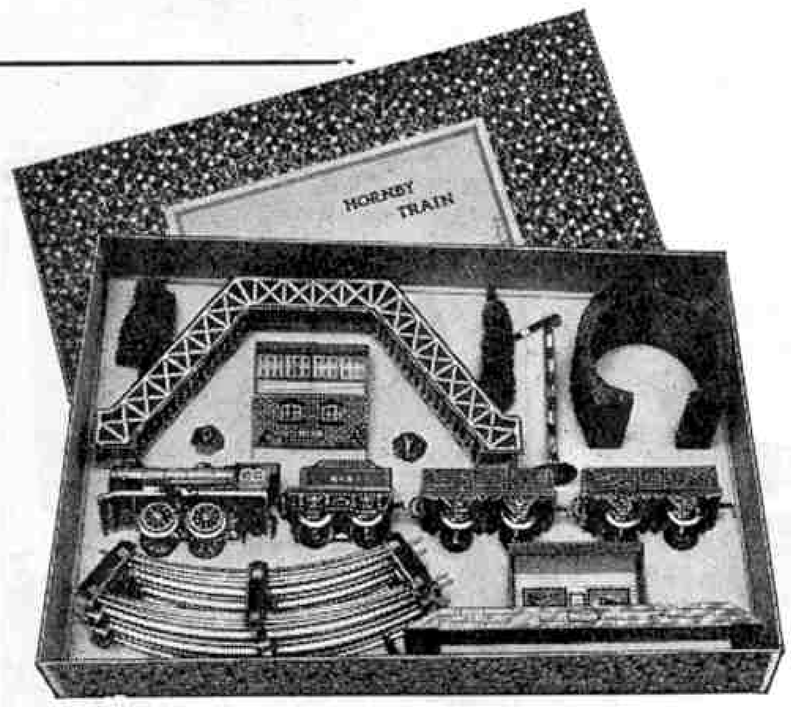
They are **Charles Letts's**

COMPLETE MODEL RAILWAY SETS

Right away for Happy Days!

These fine Model Railway Sets provide the simplest way of beginning the fascinating Hornby Railway hobby. Each Set is complete in itself; everything is there, ready for use as soon as you get it home.

Unpack the box, then lay out the rails and accessories as shown in the illustration provided, put the locomotive and coaches or wagons on the track, and begin to run your own railway! It's the greatest fun in the world!



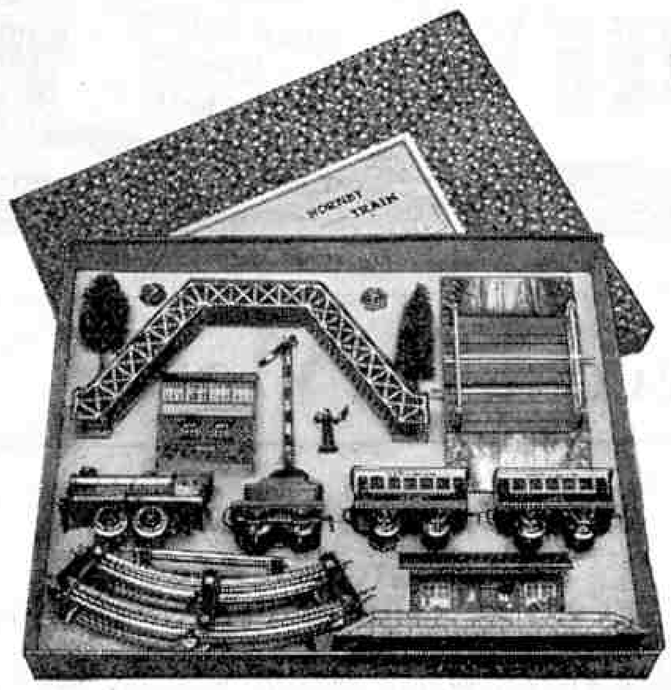
M8 Complete Model Railway Set

M8 Complete Model Railway

Consists of a fine non-reversing Locomotive that can be braked from the track, Tender, two Goods Wagons and Set of Rails; Wayside Station, Footbridge, a Signal and Signal Cabin, two Trees with Stands, and Tunnel. Packed in a strong carton as illustrated. Price 9/6

M9 Complete Model Railway

This Set includes a non-reversing Locomotive that can be braked from the track, Tender, two Passenger Coaches and Set of Rails; Station, Footbridge, Signal and Signal Cabin, Level Crossing, Guard, Porter, two Trees with Stands and two Hikers. Packed in a strong carton as illustrated. Price 12/6



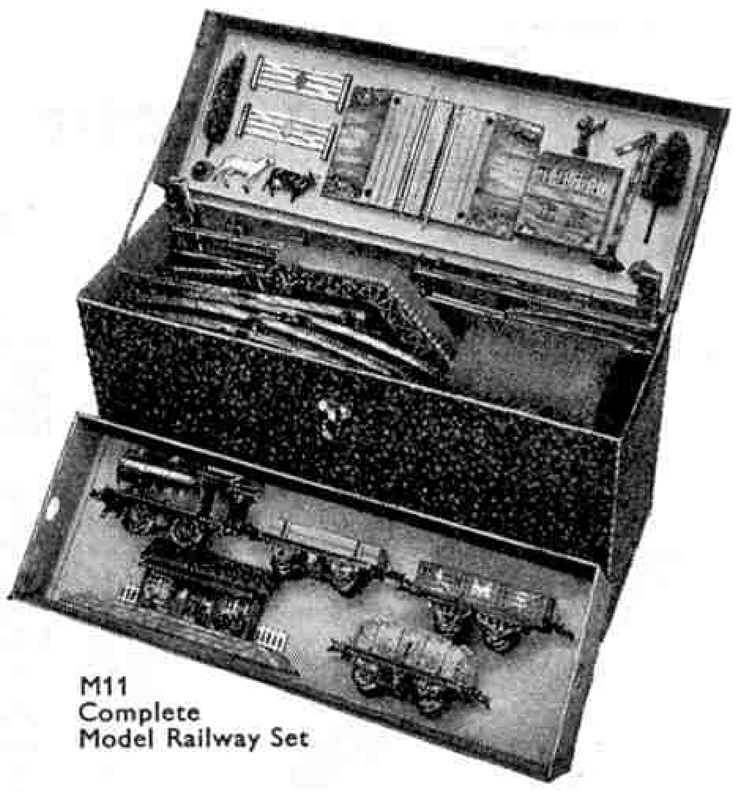
M9 Complete Model Railway Set

M10 Complete Model Railway

A larger Set containing a non-reversing Locomotive that can be braked from the track, Tender, two Pullman Coaches and Set of Rails; Footbridge, two Stations, Signal Cabin and two Signals, two Telegraph Poles, Loading Gauge, Tunnel, Cutting, Level Crossing, three Trees with Stands, two Porters, two Hikers, Horse and Cow. The Set is packed in an attractive special cabinet as illustrated. Price 19/6

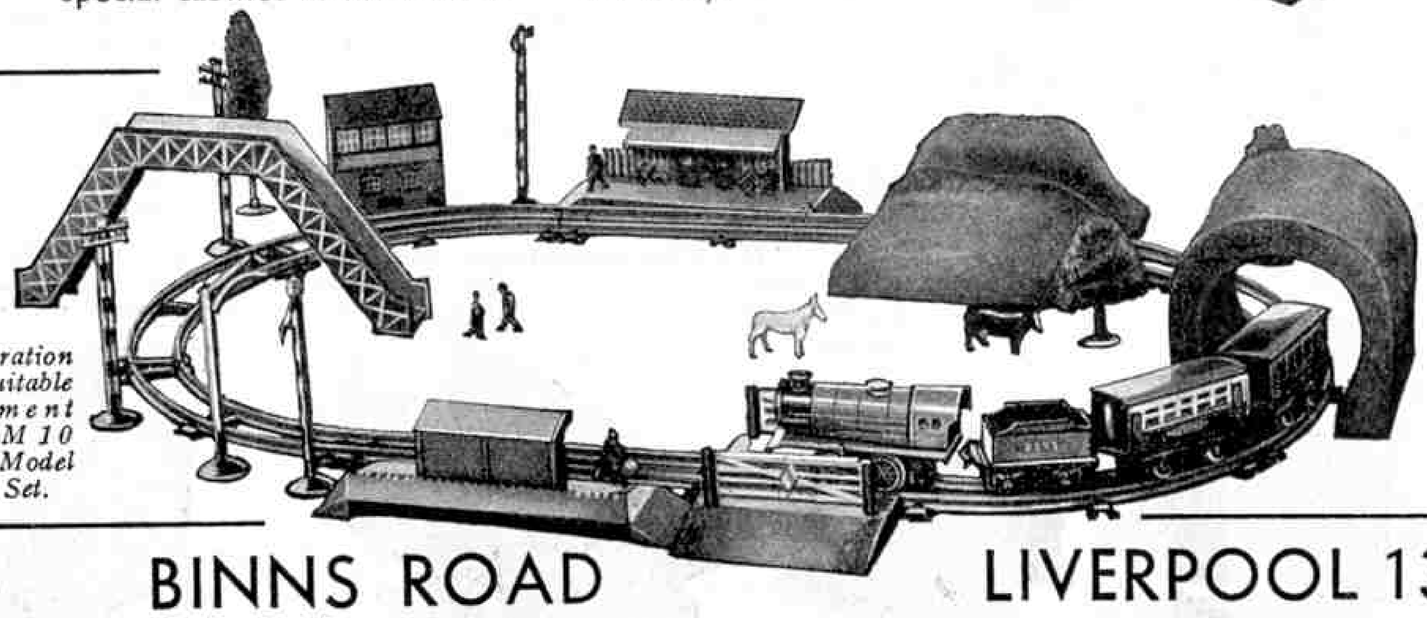
M11 Complete Model Railway

This is the largest and best of the Complete Model Railway Sets. It includes a powerful reversing Tank Locomotive that can be braked from the track, Fibre Wagon, Timber Wagon, Open Wagon and Set of Rails and Points; Tunnel, Station, Signal and Signal Cabin, Level Crossing, Footbridge, two Trees with Stands, Guard, one Cow and one Horse. The Set is packed in a strong special cabinet as illustrated. Price 25/–



M11 Complete Model Railway Set

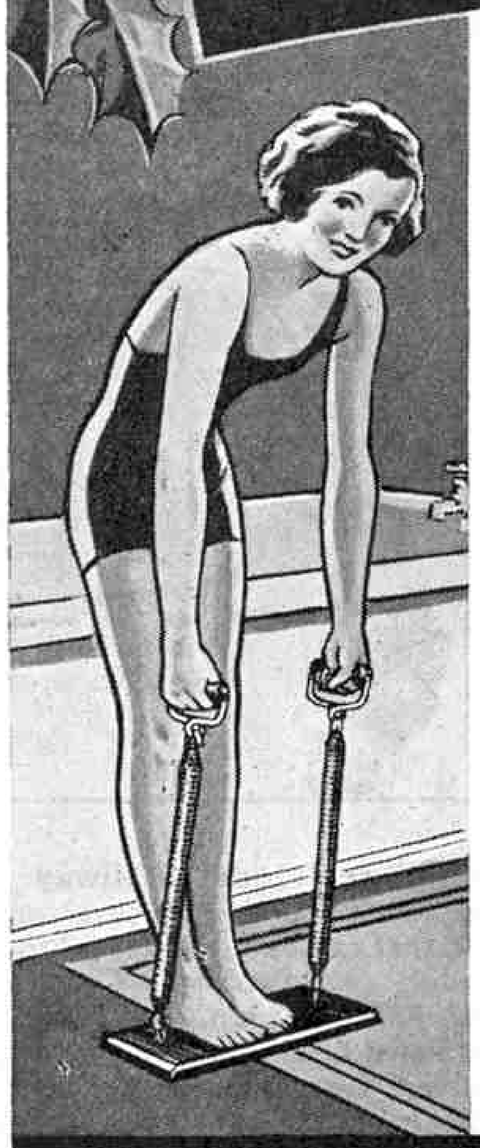
M10 Complete Model Railway Set



This illustration shows a suitable arrangement of the M10 Complete Model Railway Set.

MECCANO LIMITED – BINNS ROAD LIVERPOOL 13

GRAND FUN GETTING BIG AND STRONG START THIS Christmas



THERE'S no way to equal the Terry way of *quickly* developing strong muscles, deep chest, really BIG lung power and the speed and stamina that win at games and sports. It's grand fun, too, doing such simple, enjoyable exercises. You must get *somebody* to give you Terry's for Christmas.

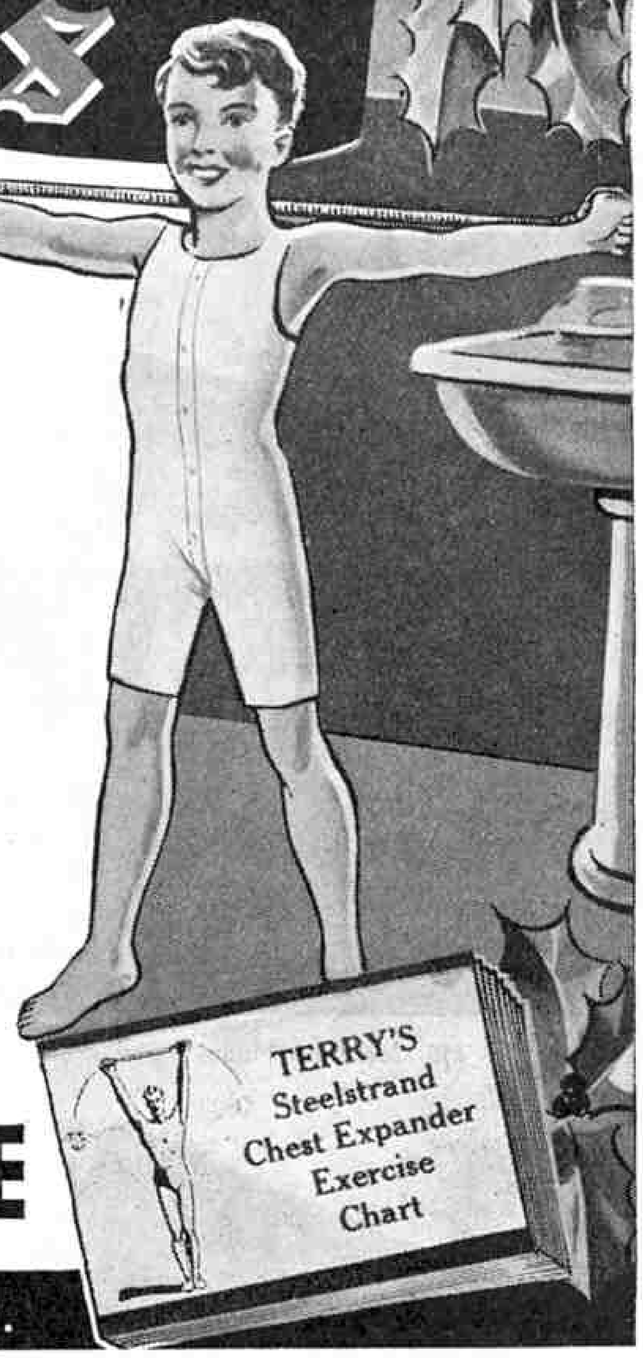
Terry Spring Exerciser No. 1174 shown on left, in attractive presentation box, costs only **10/–** complete.

Terry "Steelstrand" Expander shown on right. Single strand Models cost from **3/6** to **6/6.**

TERRYS
Steelstrand
EXPANDER

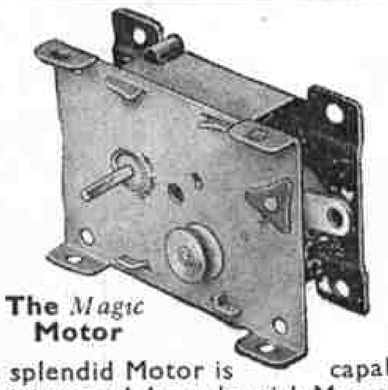
SEND FOR Illustrated descriptive leaflets or ask to see Terry appliances at your nearest Sports Dealers. Illustrated Book of Exercise Charts supplied with each exerciser. FREE

From your Sports Outfitters or post free from



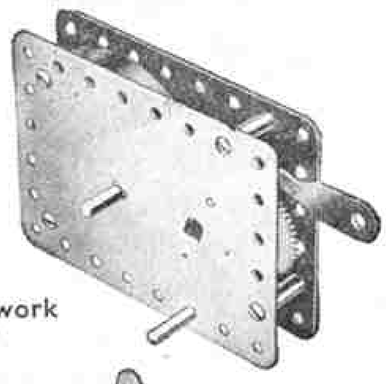
HERBERT TERRY & SONS LIMITED, REDDITCH.

Drive your models with a Meccano Motor

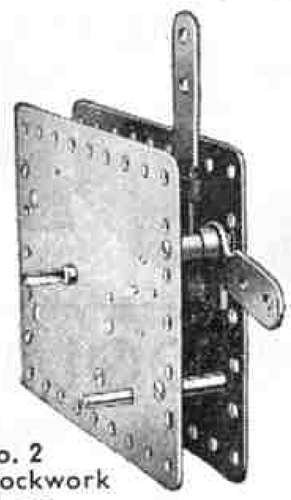


The *Magic* Motor

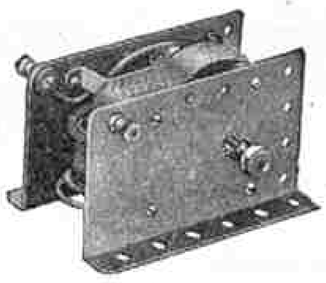
This splendid Motor is capable of driving models made with Meccano Outfits A, B and C. It costs only 2/–.



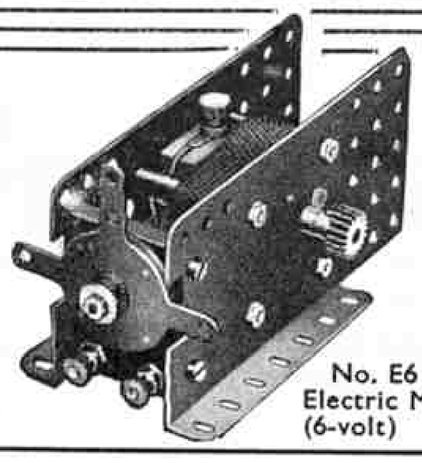
No. 1 Clockwork Motor



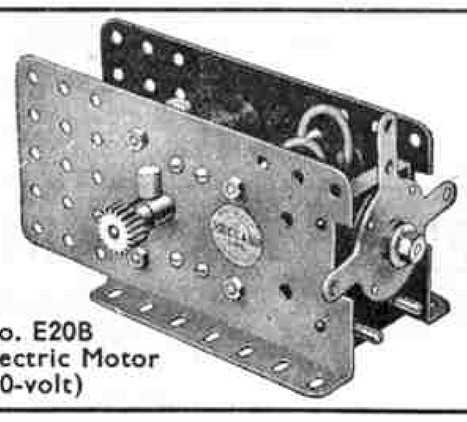
No. 2 Clockwork Motor



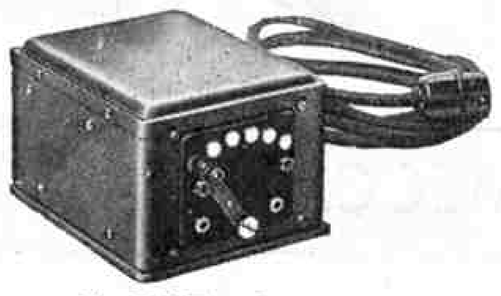
No. E1 Electric Motor (6-volt)



No. E6 Electric Motor (6-volt)



No. E20B Electric Motor (20-volt)



No. T20 Transformer

If you want to obtain the fullest enjoyment from the Meccano hobby you must operate your models by means of one of the Meccano Clockwork or Electric Motors listed below.

CLOCKWORK MOTORS

The *Magic* Motor (non-reversing)	Price	2/–
No. 1 Clockwork Motor (non-reversing) ...	,,	5/–
No. 1a Clockwork Motor (reversing) ...	,,	7/6
No. 2 Clockwork Motor (reversing) ...	,,	9/–

ELECTRIC MOTORS

No. E1 Electric Motor (6-volt). Non-reversing	Price	9/–
No. E6 Electric Motor (6-volt). Reversing ...	,,	15/6
No. E120 Electric Motor (20-volt). Non-reversing	,,	10/–
No. E20B Electric Motor (20-volt). Reversing	,,	18/6

TRANSFORMERS

The Transformers made by Meccano Limited provide a convenient and safe means of driving 6-volt or 20-volt Electric Motors and Train Sets from the mains supply where this is alternating current.

When ordering a Transformer or a Transformer-Rectifier the voltage and frequency of the supply must be stated. These particulars are given on the supply meter.

No. T6A Transformer (Output 40 VA at 9/3½ volts) for 6-volt Electric Motors or 6-volt Trains. Fitted with speed regulator and separate circuit for supplying current for eighteen 3½-volt lamps ... ... Price 22/6

No. T6 Transformer (Output 25 VA at 9 volts) for 6-volt Electric Motors or 6-volt Trains. Fitted with speed regulator ... ... Price 17/6

No. T6M Transformer (Output 25 VA at 9 volts) for 6-volt Electric Motors or 6-volt Trains. This is similar to No. T6, but is not fitted with a speed regulator... Price 12/6

No. T26M Transformer (Output 50 VA at 9 volts) for 6-volt Electric Motors or 6-volt Trains. Not fitted with speed regulator. Will operate two trains at the same time, either on the same track or on two separate tracks. In the latter case two Resistance Controllers are necessary to give independent control ... ... Price 13/6

No. TR6 Transformer-Rectifier (Output 6 volts at 1½ Amps.) for use with Hornby No. EPM16 Special Tank Locomotive (6-volt, Permanent Magnet) ... ... Price 29/6

No. T20A Transformer (Output 25 VA at 20/3½ volts) for 20-volt Electric Motors or 20-volt Trains. Fitted with speed regulator and output sockets for lighting lamps. Price 22/6

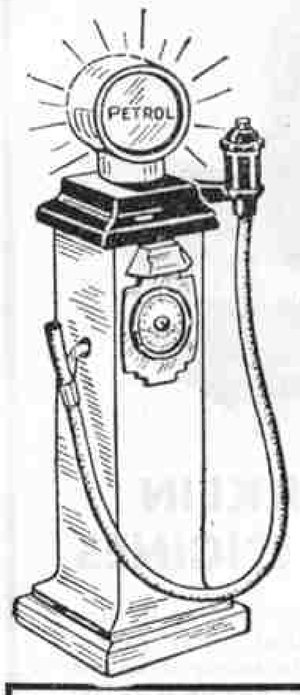
No. T20 Transformer (Output 20 VA at 20 volts) for 20-volt Electric Motors or 20-volt Trains. Fitted with speed regulator ... ... Price 17/6

No. T20M Transformer (Output 20VA at 20 volts) for 20-volt Electric Motors or 20-volt Trains. This is similar to No. T20 but is not fitted with speed regulator ... Price 12/6

No. T22M Transformer (Output 50 VA at 20 volts) for 20-volt Electric Motors or 20-volt Trains. Not fitted with speed regulator. Will operate two trains at the same time, either on the same track or on two separate tracks. In the latter case two Resistance Controllers are necessary to give independent control ... ... Price 13/6

Brighten up those Dull Evenings with

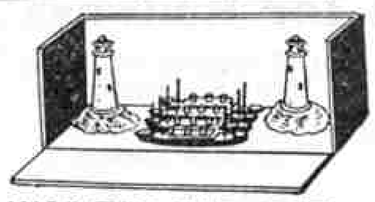
ASTRA ELECTRICAL TOYS



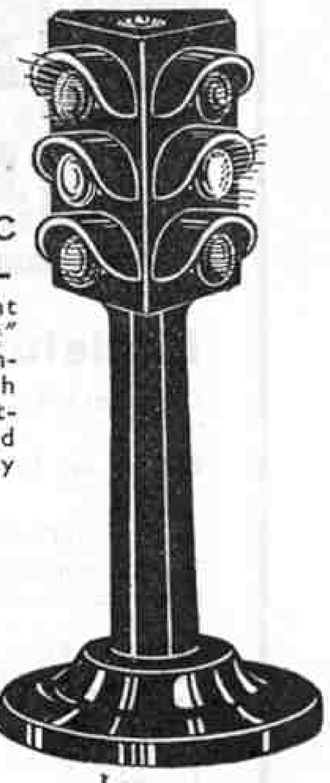
PETROL PUMP
New model, 6" high. Complete with bulb, battery and rubber feed pipe. Finished in red.
3'6

Drive away that winter gloom with ASTRA electrical toys. All Astra models are illuminated and have moving parts besides. You can see them at any good toy shop this Xmastide.

Miniature models for display on new harbour consisting of two lighthouses and three liners.
2'6

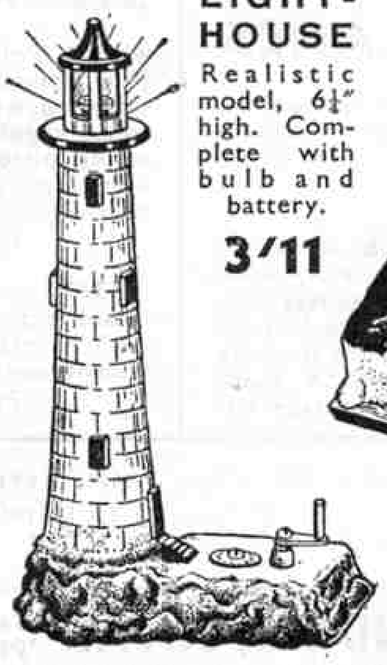


WATERLINE SET

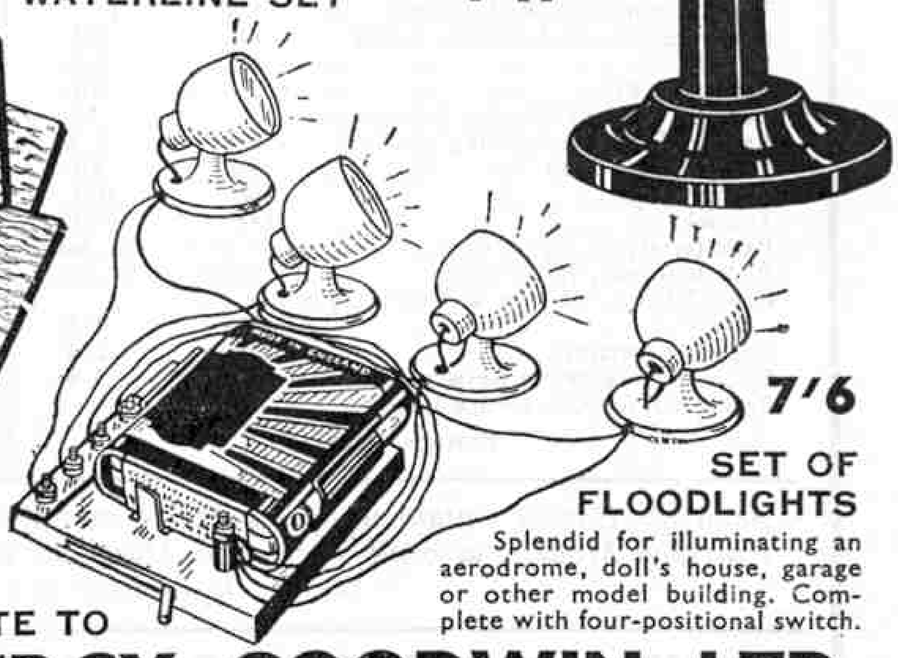


TRAFFIC SIGNAL
Six light model, 6¾" high. Complete with bulb, battery and rotary switch.
4'11

LIGHT-HOUSE
Realistic model, 6¼" high. Complete with bulb and battery.
3'11



HARBOUR
Complete with extra base pieces, swing bridge, bulbs and battery, etc.
5'11



7'6
SET OF FLOODLIGHTS
Splendid for illuminating an aerodrome, doll's house, garage or other model building. Complete with four-positional switch.

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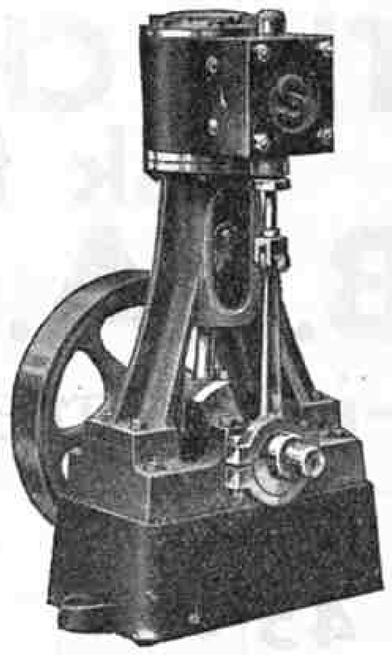

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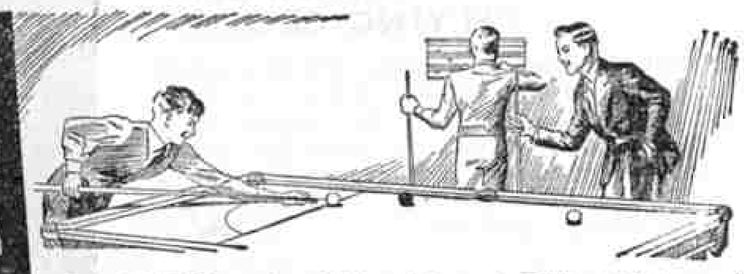

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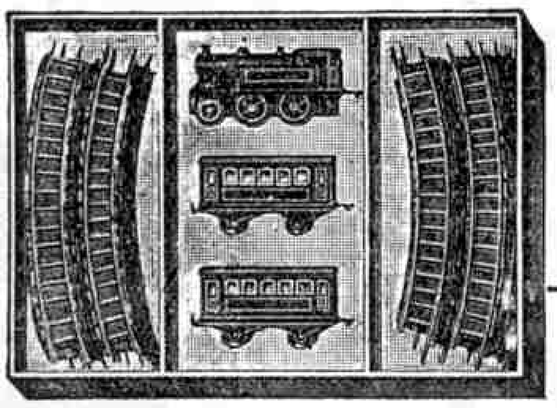

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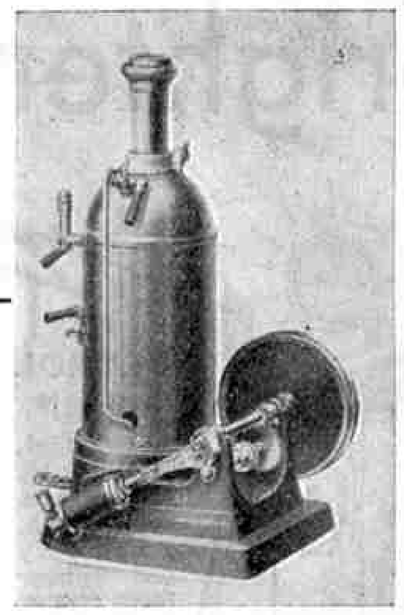

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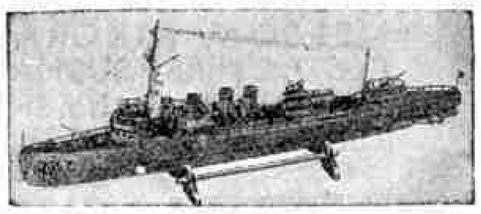

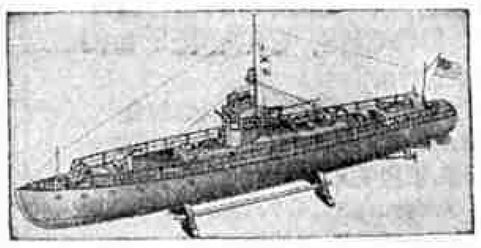

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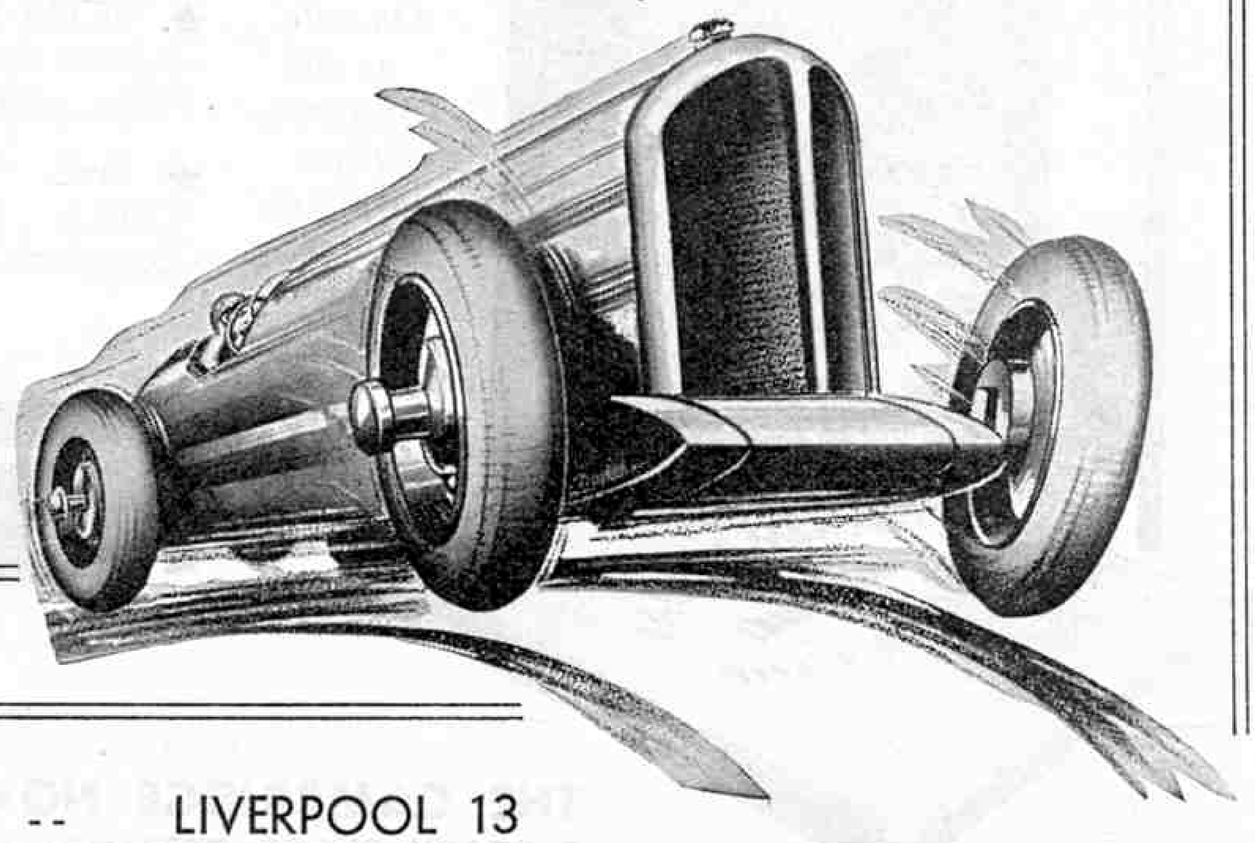

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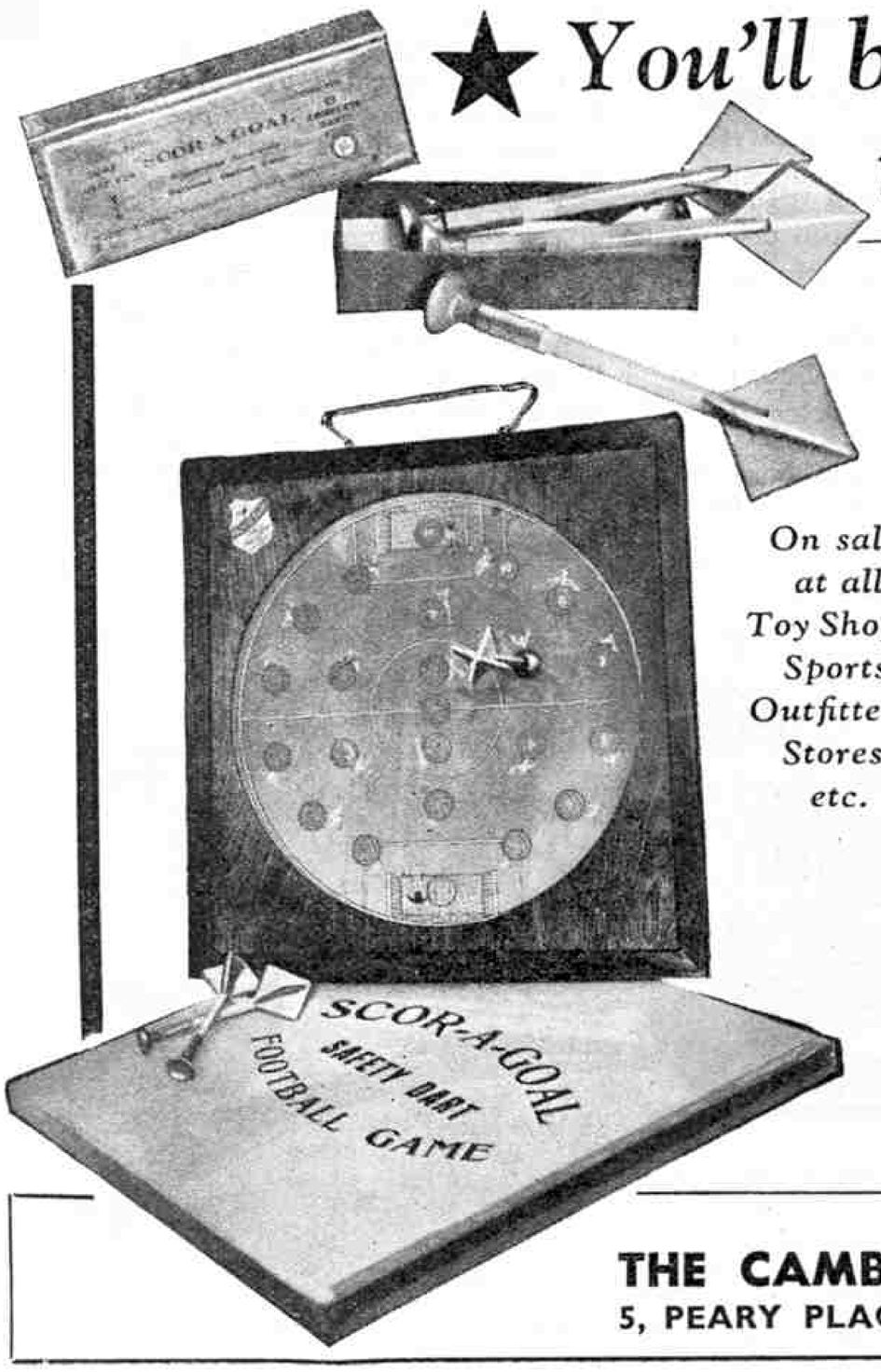

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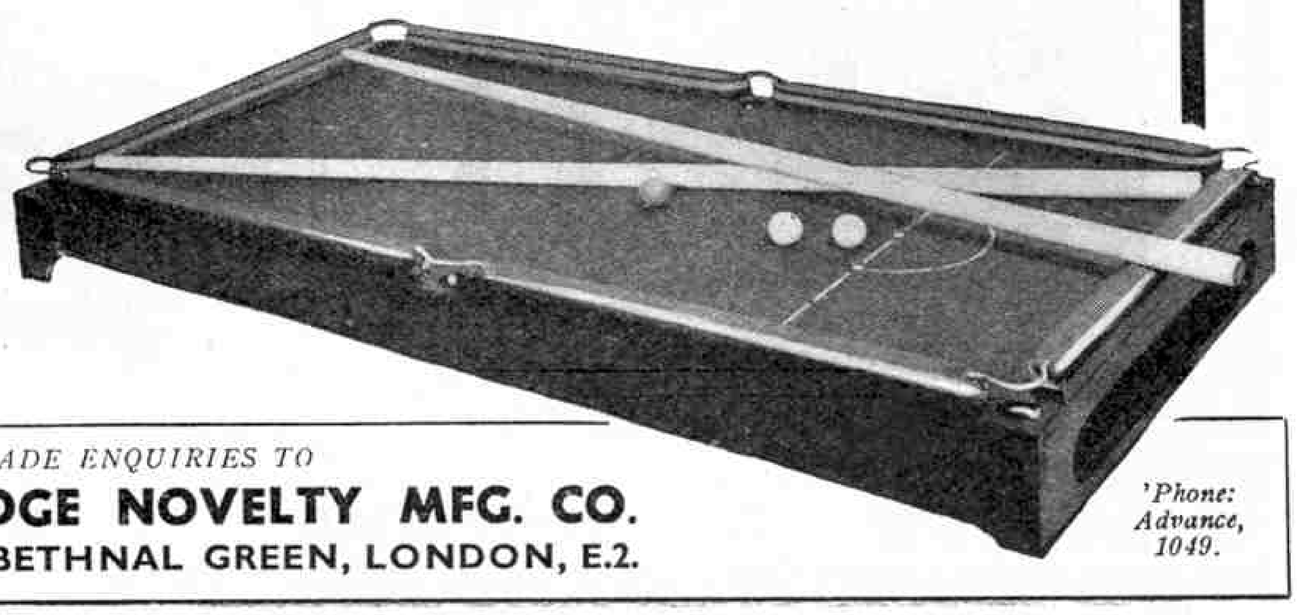

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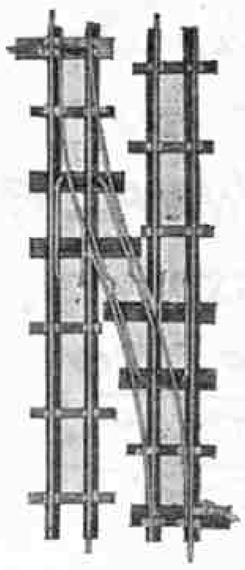

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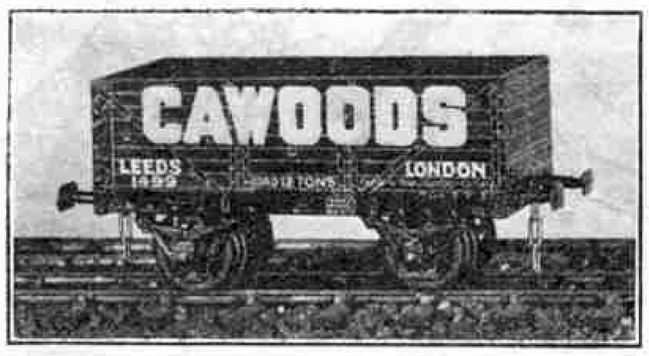

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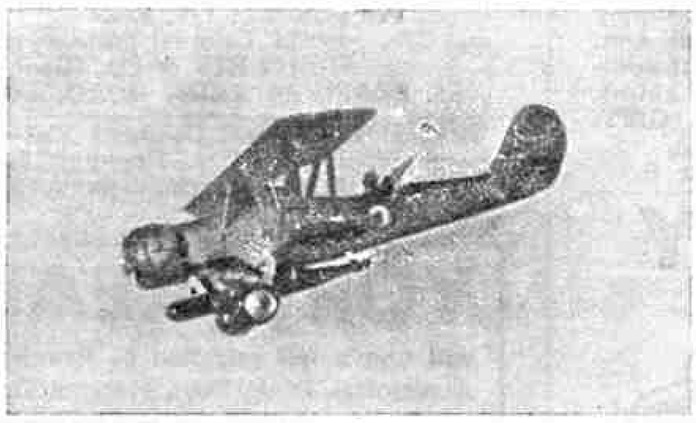

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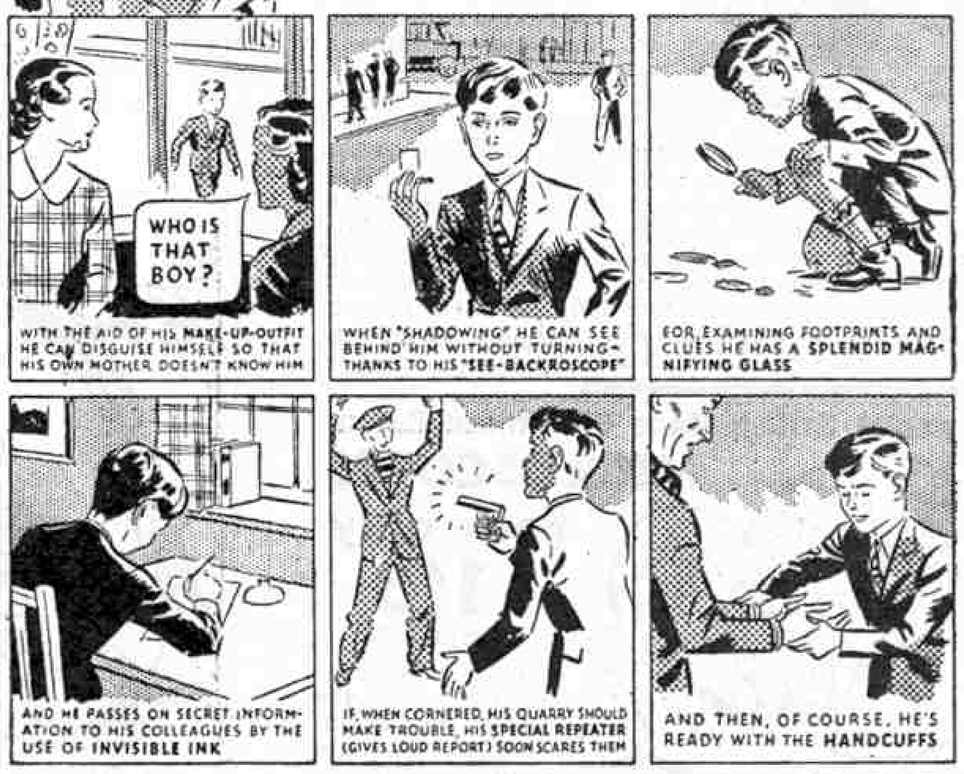

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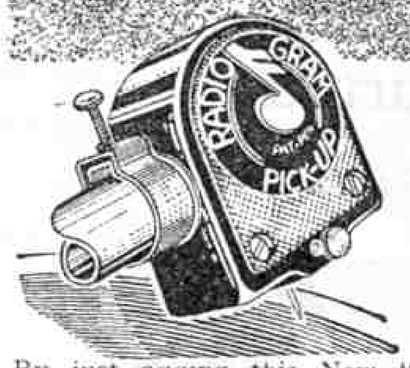

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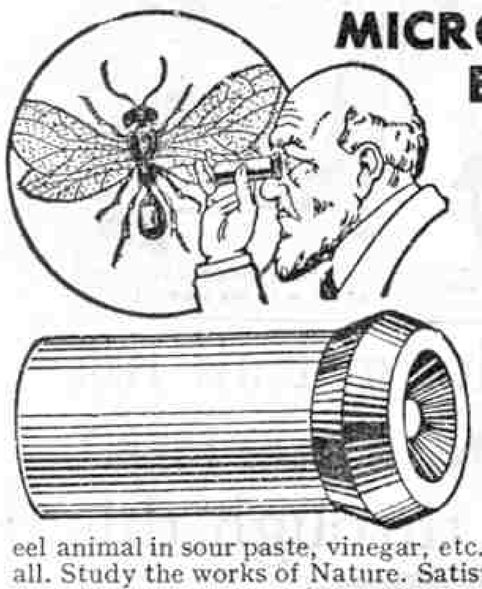

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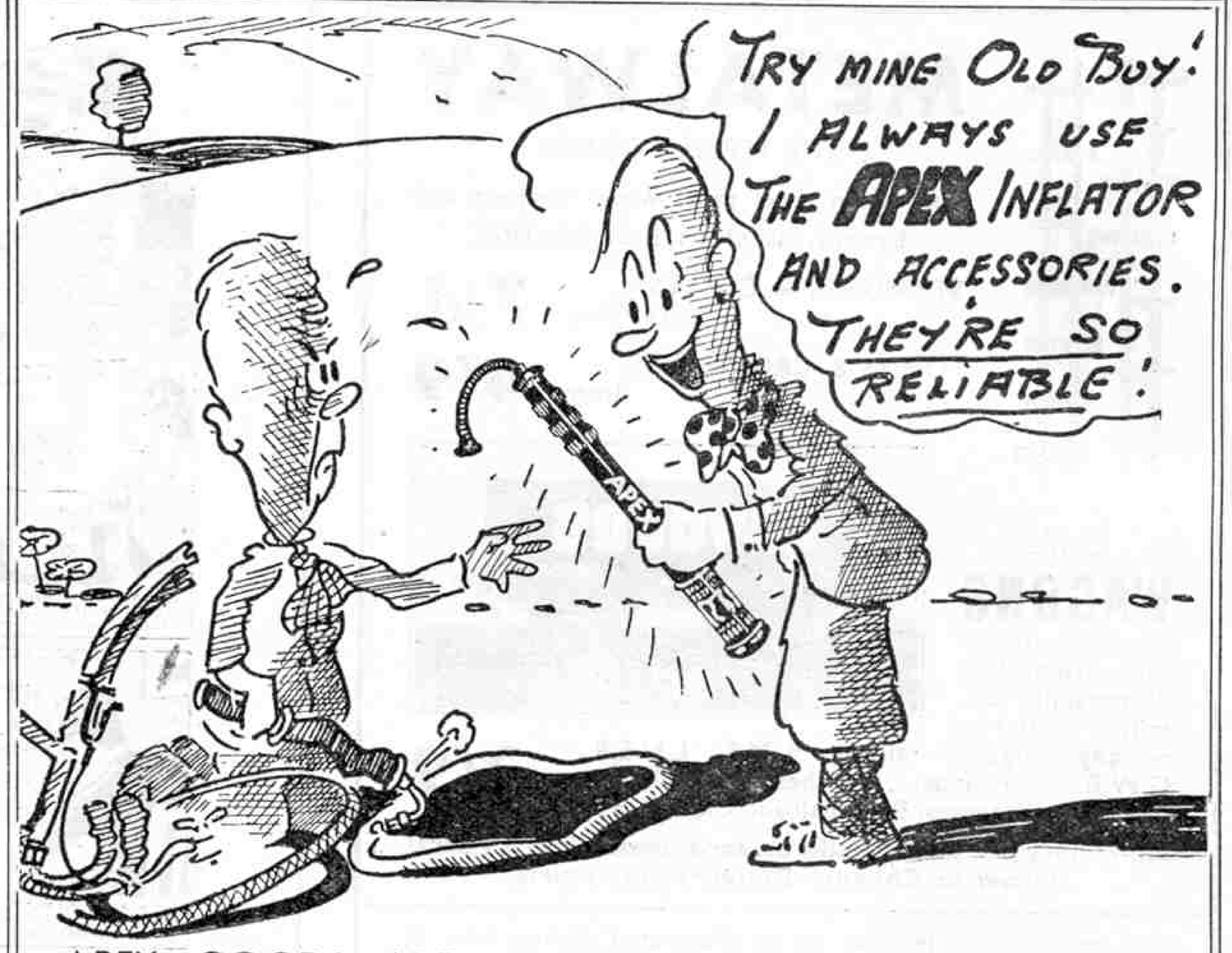

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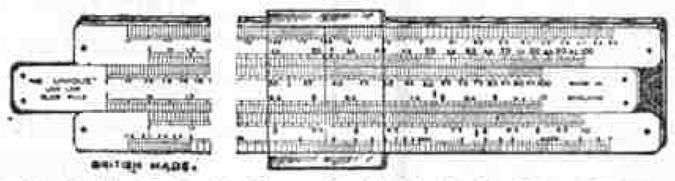

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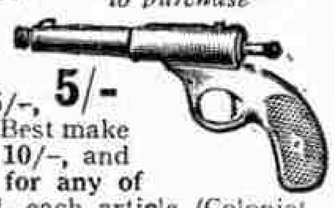

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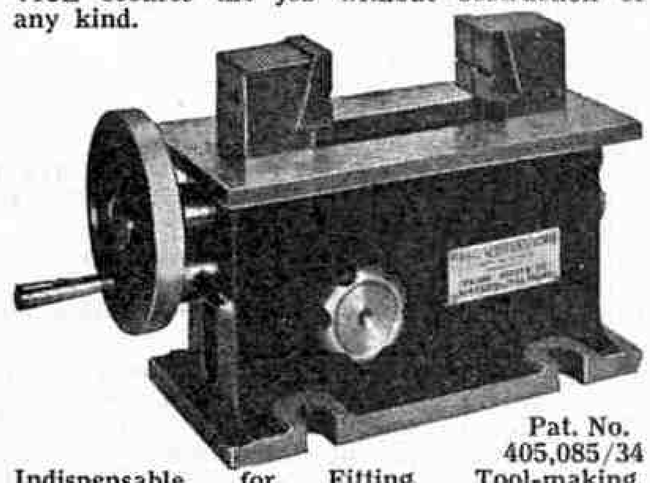

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Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Cinematograph, Filmeries No 3. New condition. Complete with accessories, 6,000 ft. Film. Price £5, carriage forward. Particulars—Kerr, 1, Silver Knowes Avenue, Davidsons Mains, Edinburgh 4.

Sale. £14 Cinematograph, take £6; also Cinematograph Mechanism with Lamphouse and Lens, 7/9; 300 ft. 9.5 mm. Film, 8/6; few 100 ft. 35 mm. Film, 1/3 each; quantity Photographic Papers, 12 for 2/–, Postage paid.—Robt. Hobbs, 83, Curling Crescent, King's Park, Glasgow.

"M.M.'s," 1933-34 complete, 5/6; 57 consecutive "Magnets," 2/6. All perfect condition.—Anderson, 1, Kersland Street, Glasgow, W.2.

Sale. Unbound "Railway Wonders of World"; "Chums," Sept. 1932–July 1934; "Listener," 319–398. All complete. Perfect condition.—Hunter, 197, Greengate, Barrow, Lancs.

America! Japan! 4-Valve All-wave Kit. Valves, Batteries, Speaker, Diagram, 37/6. Best Components. Microphone, 2/6. Offers considered.—William Ward, Runner End, Holme, Yorks.

For Sale. No. 7 Meccano Outfit in Cabinet. Condition complete and almost as new. Price £15 or near offer. Can be inspected at address below.—Crichton, 751, Springburn Road, Springburn, Glasgow.

Pathé Home Movie, double claw movement, resistance complete, £4/10/–. Send for list of surplus 9.5 Pathé Films for disposal, suitable prices.—85, Killinghall Road, Bradford.

Bassett-Lowke "Flying Scotsman," Gauge "O," clockwork, brand new, list 4-4-0, accept 50/–.—Markham, 24, King Richard Street, Coventry.

Sale. Soldiers, Books, Games, Miniature Cars, Old Galleon, "Modern Boys," September 1935–July 1936, and odd dates for 1935. Stamp for list.—P. Royle, Stanmore Lodge, Lancaster.

For Sale. "Meccano Magazines," 1921–1934 inclusive, also three binders; "Railway Magazine," Jan.–March 1925, Jan. 1927–Nov. 1928; "Kodak Magazine," 1930–1933. Offers. Will separate.—Farr, 35, Abbotsford Road, Bristol 6.

Bing Railway Accessories and Trucks for sale. Stamp list.—Tingley, Winfrith, Mowshurst, Edenbridge, Kent.

Sale. "Meccano Magazines," July–December 1923, April–December 1924, except August, January 1927–December 1930, September 1931, December 1931, September 1932. Excellent condition.—Coates, 17, Lovaine Place, North Shields.

"M.M.'s," January 1932–January 1936. Spotless. 1930, 1931 without covers, 10/6.—15, Conduit Road, London, S.E.18.

Native carved Ivory Elephant, fitting into half-inch bean, P.O. 3/–.—Raine, 20, Halford Road, Durban, S. Africa.

Set 4 vols. "Amateur Mechanics," 22/6; also set 4 vols. "Practical Woodworker," 22/6; sent rail free (South Africa). (Cost 60/– each).—Raine, Halford Road, Durban, S. Africa.

For Sale. Large collection Britain's Soldiers, Infantry, Cavalry and Guns. Many Regiments and Nationalities. Good condition. Half list price, or reduction for quantity.—Bantock, 182, Soho Road, Handsworth, Birmingham.

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For Sale. "Meccano Magazines," January 1926 to February 1934. All in excellent condition.—Box No. 1201.

Wanted. 9.5 Millimetre Films. Send particulars to—Russell, 71, Fernhurst Road, Southsea, Hants.

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Red—Green Meccano Parts in Wooden Storage Cabinet; E20 Electric Motor and Steam Engine included. Value £10/10/–. £5/5/– or reasonable offer.—L. J. Kennard, 205, Ashley Road, Parkstone, Dorset.

Sale. Gauge O Railway, Bing and Bowman. Good condition. Cost £4. What offers? Write for particulars.—Lawrence, 17, Thane Villas, Holloway, London, N.7.

135 "M.M.'s," 1925–1936, 25/– or nearest. Stamp collection 7/–; Model Railway, Rolling Stock, Track. Particulars—Smith, 47, Jasper Road, Enfield Highway, Middlesex.

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Telegrams: "Meccano, Liverpool."

Publication Date. The *"M.M."* is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/– for six issues and 8/– for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

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READERS' SALES—*Continued from Col. 1*

Sale. "M.M.'s," 1930-5 incl. 6 vols. bound. Sell one volume or all. 8/– per volume, post free.—McCrimmom, 2906, N.E. 45 Avenue, Portland, Oregon, U.S.A.

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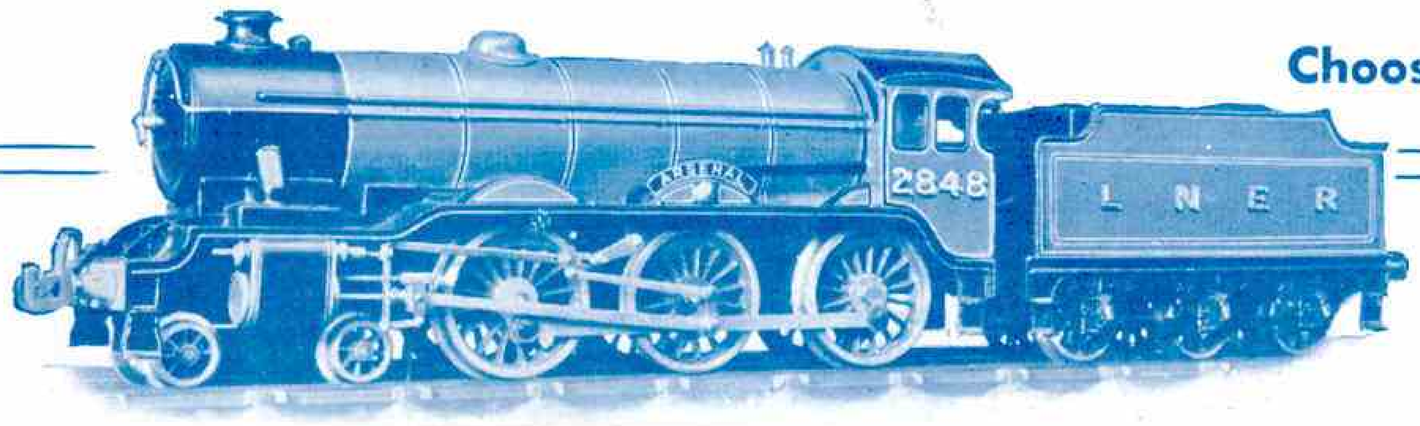

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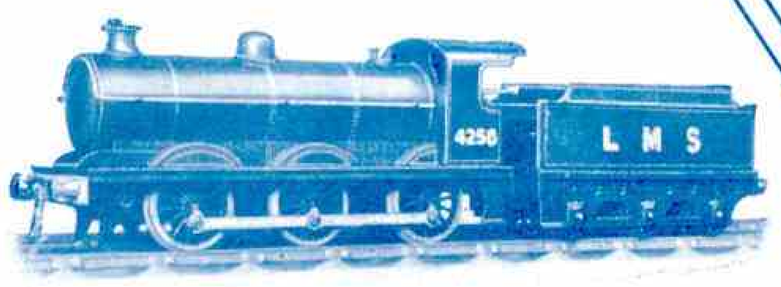

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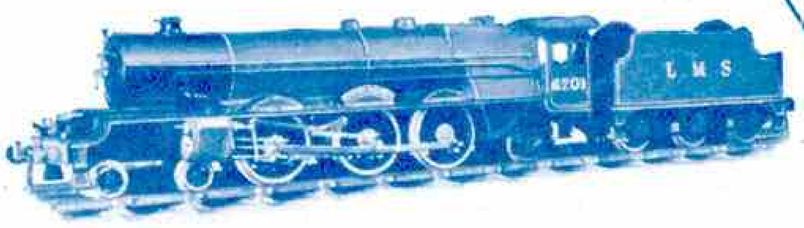

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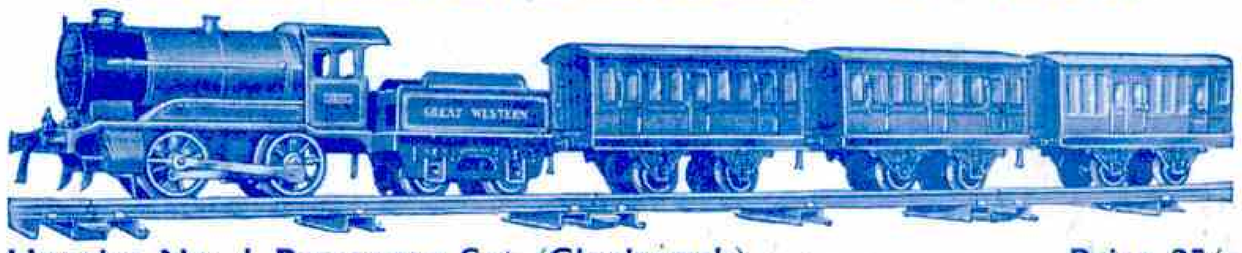

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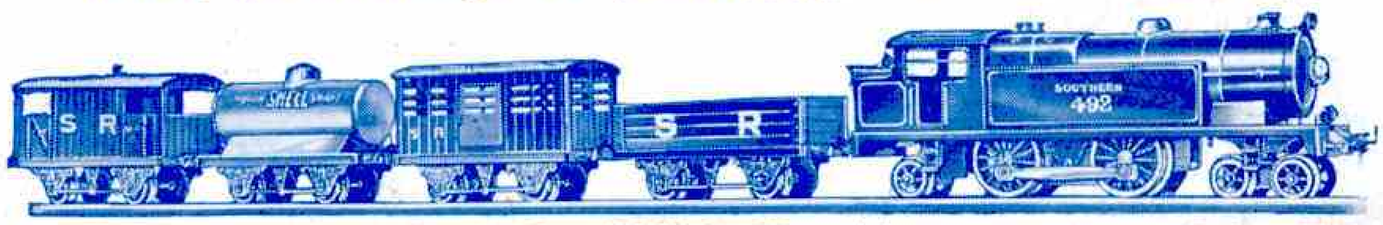

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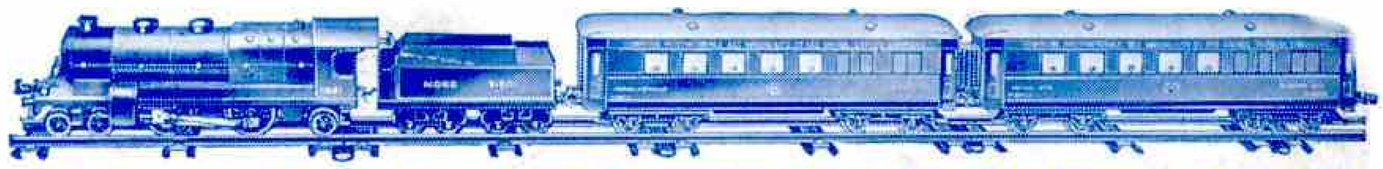

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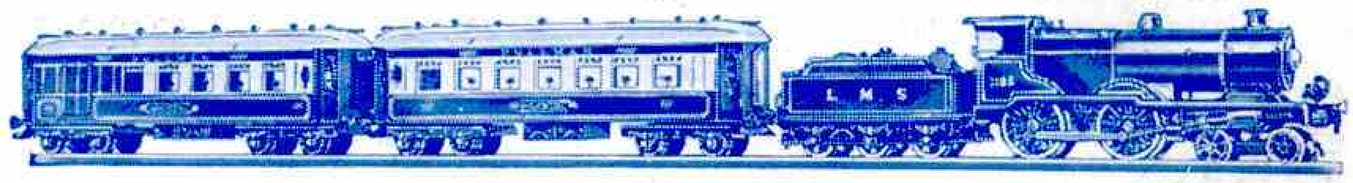

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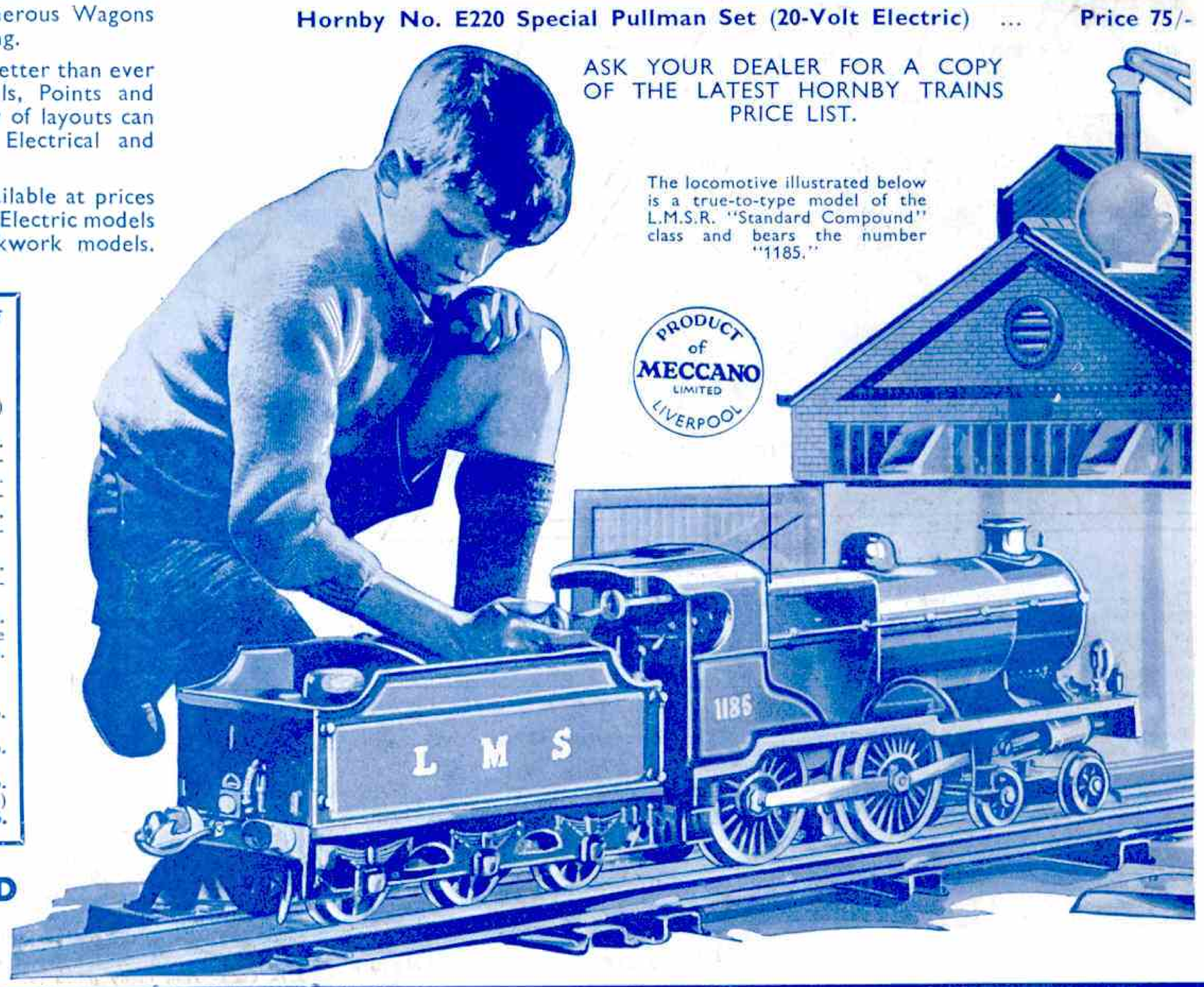

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